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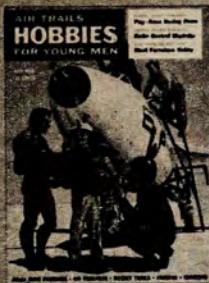
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FOR YOUNG MEN



While the research pilots in their green G-suits give Mac Modeler's S.E.-5 the once over, Mac's friend and mechanic, Henry Helper, has a chance to check into the "office" of a Convair F-92A delta wing test plane. Kelly Franz did the painting. Looks like a wonderful place for flying a model plane—not a single obstruction in sight!

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Editorial Production...Carl Happel

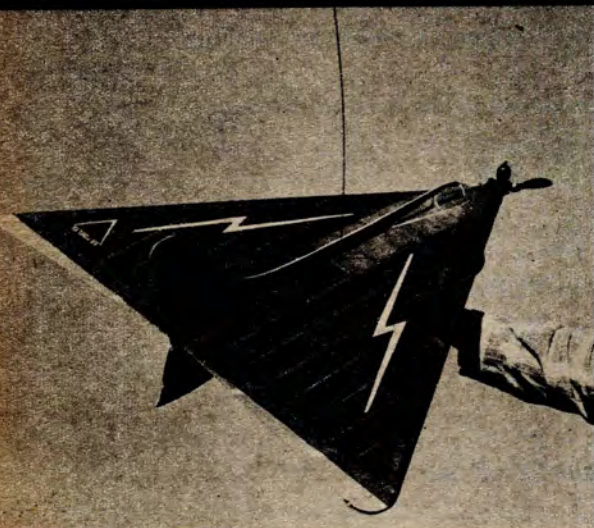
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Radio controlled Skydelta: page 22



Some ceramic, hey? This from Corning Glass Works. See pg. 34

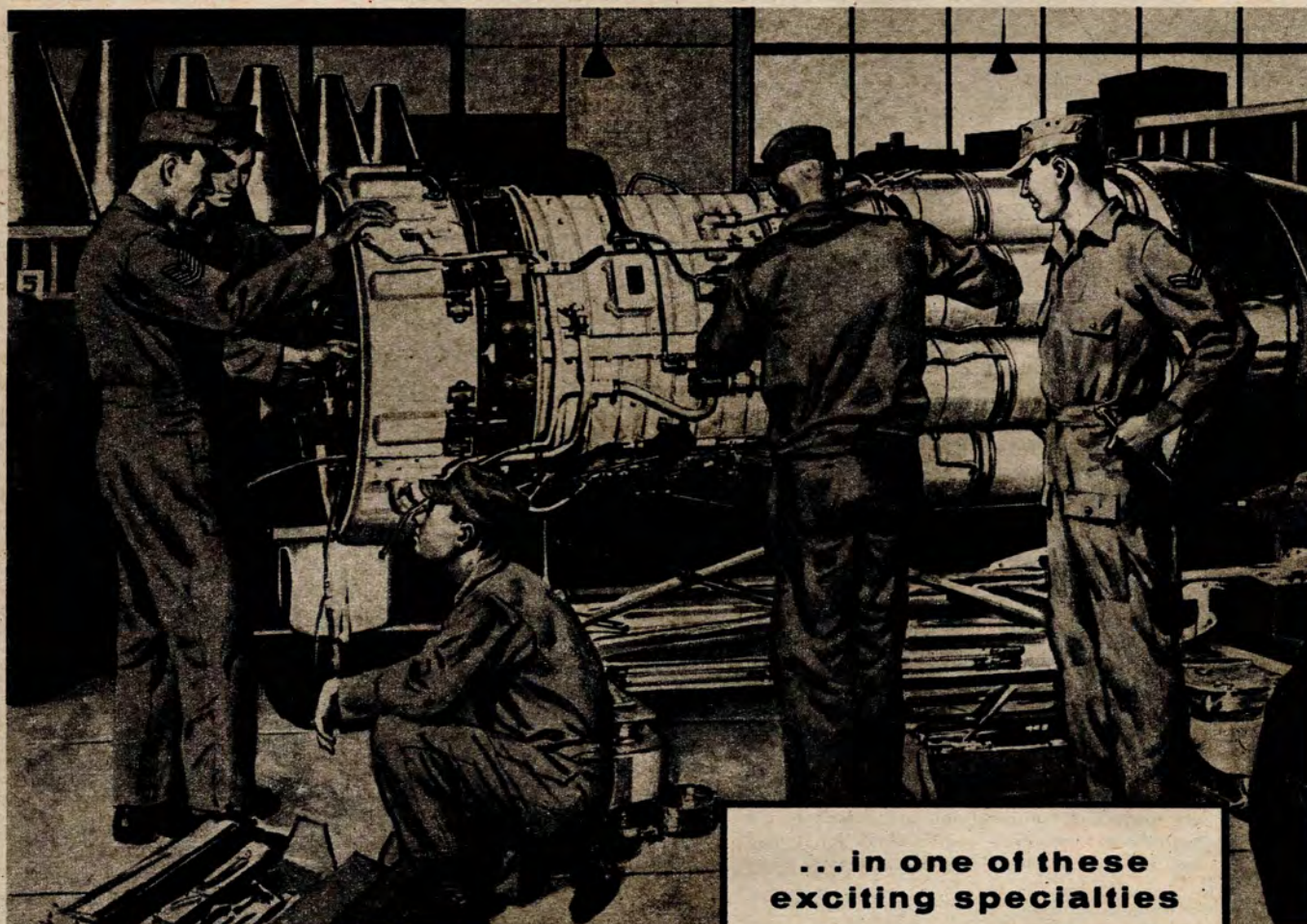
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Air Trails HOBBIES For Young Men published monthly by Street & Smith Publications, Inc., at 575 Madison Ave., New York 22, N.Y. Entered as second class matter at the post office at New York, N.Y. Authorized as second class mail Post Office Dept., Ottawa, Canada. Copyright 1955 by Street & Smith Publications, Inc., in the United States and countries signatory to the Berne Convention and Pan American Convention. 35c per copy. This issue is Vol. XLIV, No. 2. We cannot accept responsibility for unsolicited manuscripts or art work. All submissions must include return postage. Printed in U.S.A.

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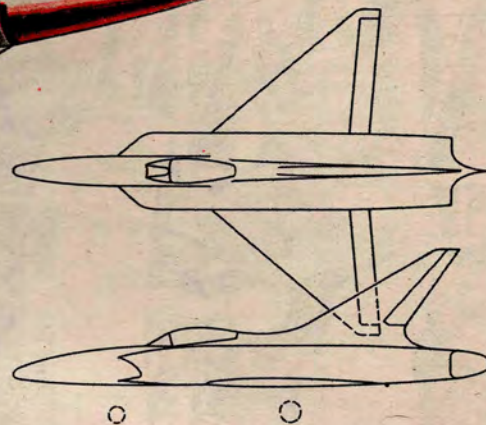
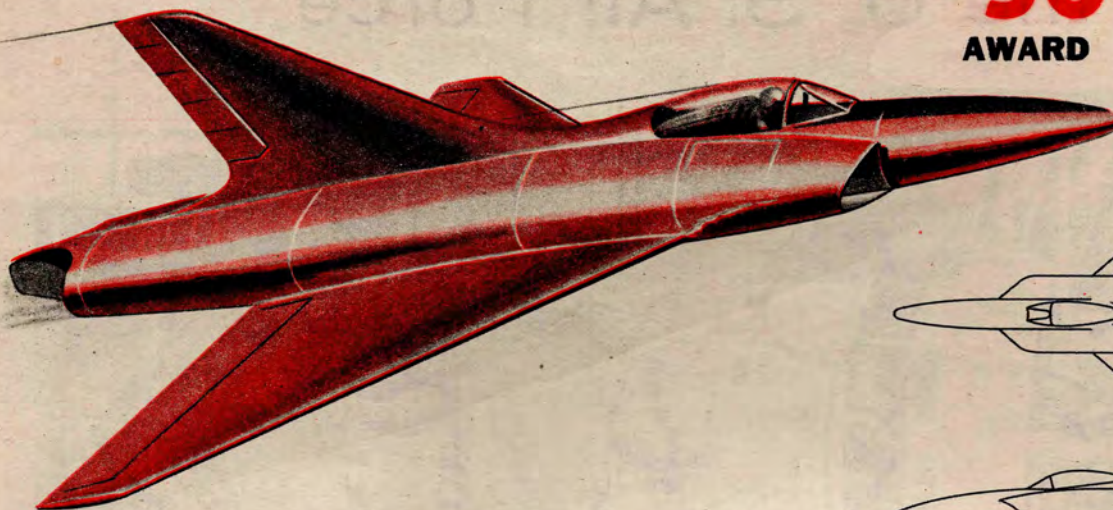
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AIRCRAFT DESIGN COMPETITION

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Short range interceptor by Dave Scott of Santa Monica, Calif. It is a delta-type airplane with two jet engines rated at 10,000 lbs. of thrust each and afterburners for added power. The plane is capable of Mach 1.12 in level flight. For armament it is equipped with two rocket launchers similar to the ones used on the F-86D; when in use these are lowered from their retracted positions under the nose. Search and aiming radar are enclosed in the nose.

SECOND
\$25
AWARD



Roadable airplane by Charles G. Scott of Los Angeles. It is of canard type, powered by a 135 hp pusher engine. In order to convert it for ground use wings and horizontal tail are detachable; a two-cylinder motorcycle engine of 40 hp is used then for driving. Headlights are in elevator stubs.

THIRD
\$10
AWARD



Personal or executive type twin-jet transport by John Hanson of Rochester, Minn. Resembling slightly the Douglas B-66, on a small scale, this airplane can carry ten passengers. Engines develop 4000 lbs. of thrust each, giving the ship a top speed of around 500 mph. Span 60 ft., length 52 ft.

Rules governing this "aircraft of the future" competition are as follows: Three-view sketches of the envisioned aircraft will be required. These should be not less than 8½ x 11 inches for the entire three views. Give sketches of the complete airplane or space craft in three-quarter front and rear positions. Photos of a model of the proposed design may be included. Informa-

tion on the powerplant(s), estimated performance, dimensions, and explanations of any unusual features are required. Data as to age, occupation or schooling of the entrant will be welcomed by the editors and judges. The design may be of any type; space craft, commercial, military planes (fighters, bombers, troop transports), planes for the private flyer and sporting

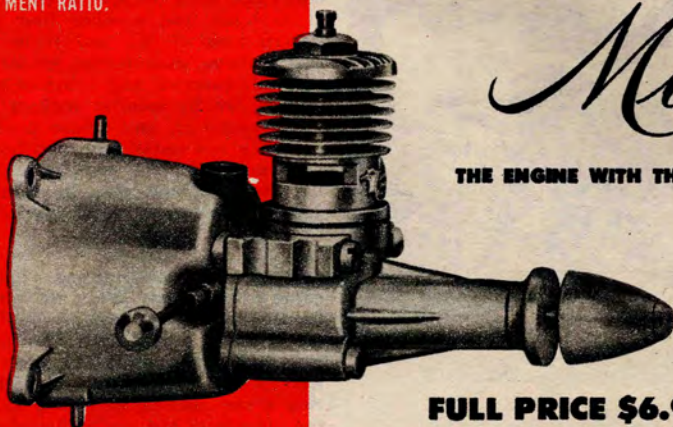
or racing planes. The entry each month judged the most practical or of the greatest significance will receive an award of \$50; \$25 for second place and \$10 for third. Mail entries to Airmen of Vision, c/o Air Trails HOBBIES for Young Men, 304 E. 45th St., New York 17, N. Y. The editors regret they cannot enter into any correspondence on submissions.



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Model Car News®



Hopped-up engines, the I.A.A.M., South African speed marks and AMRCA voting—yessir, we got it all here!

■ That fine photographic study of a model race fan setting the ignition timing of his homemade Custom Proto is by Bob More. The subject is New York City's Dave Berman shown just before he topped 141 miles per hour at the Bethlehem, Pa., track. This was Dave's first time over 140 and naturally he was a very happy fellow.

Hopping up engines is a favorite subject with any modeler concerned with high-speed operation, be it for planes, boats or cars. Some engines can benefit by hopping, others can't. In race car circles the Dooling engine is considered the last word, and is one engine that isn't much improved by radical hopping. However, there are little things most any home workshop man can do that will help squeeze a few more rpm's out of the power plant, and several are shown here. They are intended for use on the Dooling .29 engine, and were sent to us by Franny Wolf (513 Vesta Pl., Reading, Pa.), an old hand at the hopping game.

First thing to do is remove the back cover, and the rotor; be careful when you take out the cotter pin that holds the little spring on the outside of the backplate—the spring can snap off and disappear across the room! Cut one loop (only one) from the spring. Obtain a stock Dooling .61 rotor shim and trim approximately 1/16" all around the outer edge with a pair of scissors; you must do

this so the shim will not obstruct the venturi opening. The spacer is only .001" thick, so this job is easy. While you have the motor off, "break" edges labeled X on the sketch. Note that "break" doesn't mean to hack at them with a file—just round off the sharp edge slightly. Carefully run a 5/16" drill clear through the venturi to open it up a bit. Clean things up and reassemble. Then take your car out and clock a new high speed!

Race Car Fans were saddened to hear of the death of Joe Ilg, Jr., who lived at Laureldale, near Reading, Pa. Joe was only 29, but had long been engaged in all sorts of racing activity—as one of our informants said, "... anything, so long as it was noisy." Though confined to a wheelchair for the past 10 years, Joe was very active in both model and big car racing. He conducted a hobby shop in his home some years back, and engaged in model car competition all over the U.S.; his pale blue cars used to give the other contestants a really hard time, and he held several national records, best of which is probably his Custom Proto mark of 146 mph, made in 1951. Some of his records still stand.

When model car racing hit a slump a few years back, Joe got into the bigger car activities through Stocks, Three-Quarter Midgets and Micro-Midgets; he built a winning TQ, with Wayne Doerster as driver, and had several success-

ful Micros. He was spark plug of the Berks Micro-Midget Club, one of the largest and best known in the country. ATH readers may remember the picture of Joe cheerfully "giving the word" to a couple of young racing aspirants, in this Column, Aug. 1954 issue.

An association catering strictly to the builders of exact scale car models has come to our attention. It is the International Association of Automotive Modelers, and their creations cover all fields—antique, classic, sports, racing, etc. Many of the members use commercial model car kits as a basis for their work, but go far beyond what the kit makers could hope to do in the way of detail and scale perfection. Members are located in such countries as England, Germany, Japan, Italy and Canada, and all are tied together by means of a very well-produced news publication—the I.A.A.M. Bulletin, which comes out monthly.

Recent issues of the Bulletin contain 16 pages, and carry critical notes on new model car kits, reviews of model and large car publications, classified ads from members, construction kinks and methods. Each issue features about four pages of sketches and another four pages of illustrations of big and little cars. As noted above, commercial model car kits are well covered, and some of those described are by smaller makers we have never heard of, and whose products are probably not nationally distributed. The dues are \$2.00 per year, which includes the Bulletin, and may be sent to Phil Jensen, Secretary (170 Lancaster St., Cohoes, N. Y.).

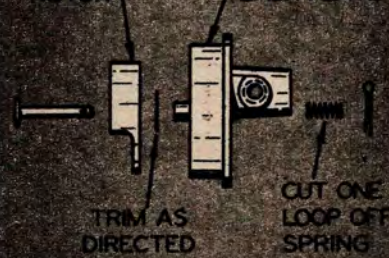
Some International speed racing notes come from Franny Wolf; he tells us that the model racing boys in South Africa don't use the centerpost platform that is seen at American tracks. After the man who has the whipping job assists in getting a car running he has to scamper to the outside of the circle; American whippers simply step up onto the safety platform, staying there till the car stops—which doesn't take too long at the speeds they go (Continued on page 76)

ENLARGE TO 5/16 IN. DIA.
ALL WAY THROUGH



BREAK ALL SHARP EDGES
MARKED "X"

ROTOR BACK PLATE

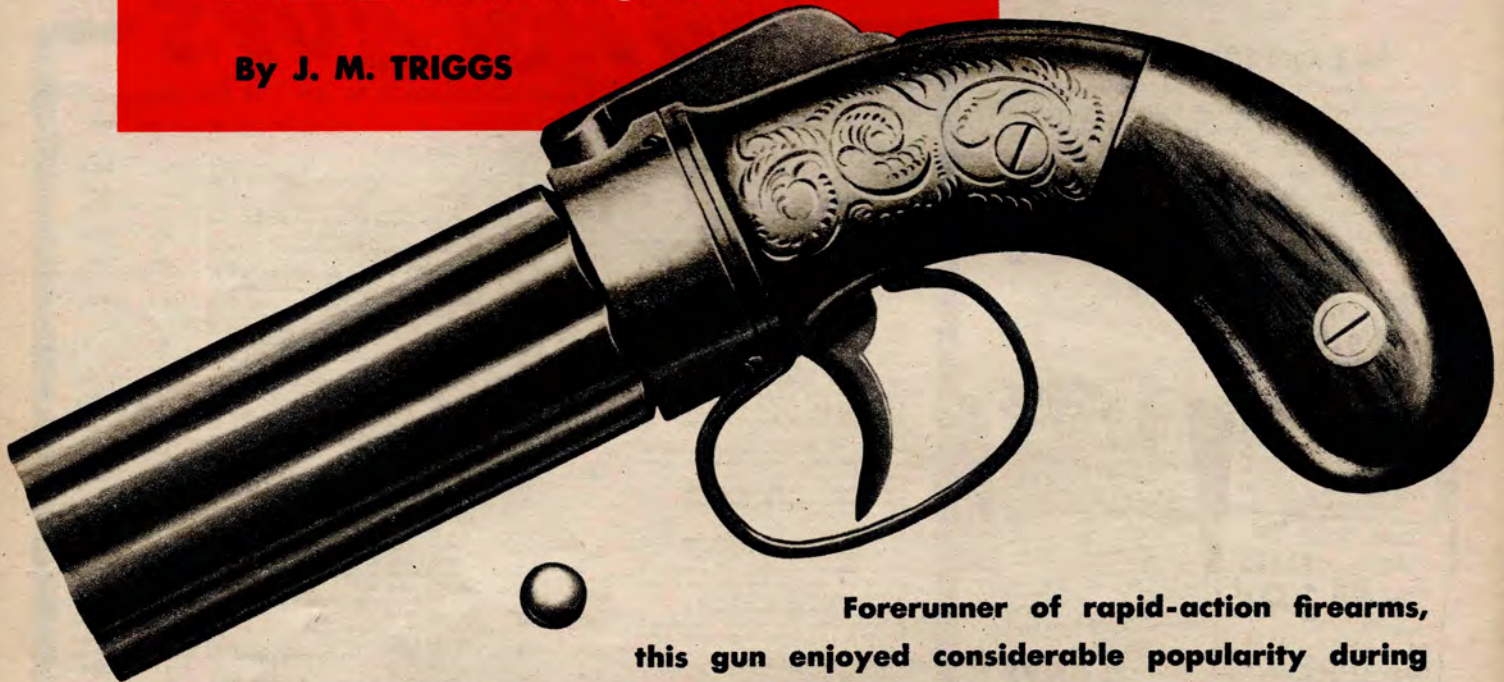


For the Weapons Collector

Ethan Allen's PEPPERBOX

By J. M. TRIGGS

GUN SHOWN
ACTUAL SIZE



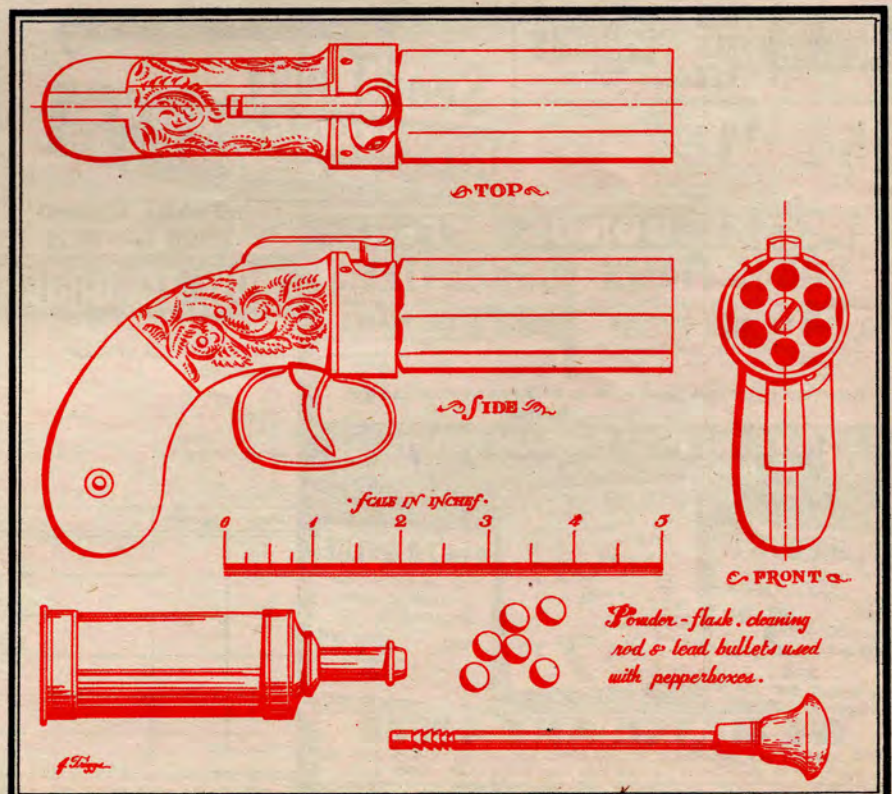
Forerunner of rapid-action firearms,
this gun enjoyed considerable popularity during
the wild and woolly days of the Gold Rush

■ Ethan Allen, the Massachusetts gunsmith, was a pioneer in the use of machine-made interchangeable parts for firearms. He set up his shop in Norwich, Conn., and later in Worcester, Mass., and manufactured his famous Pepperboxes between 1837 and 1865.

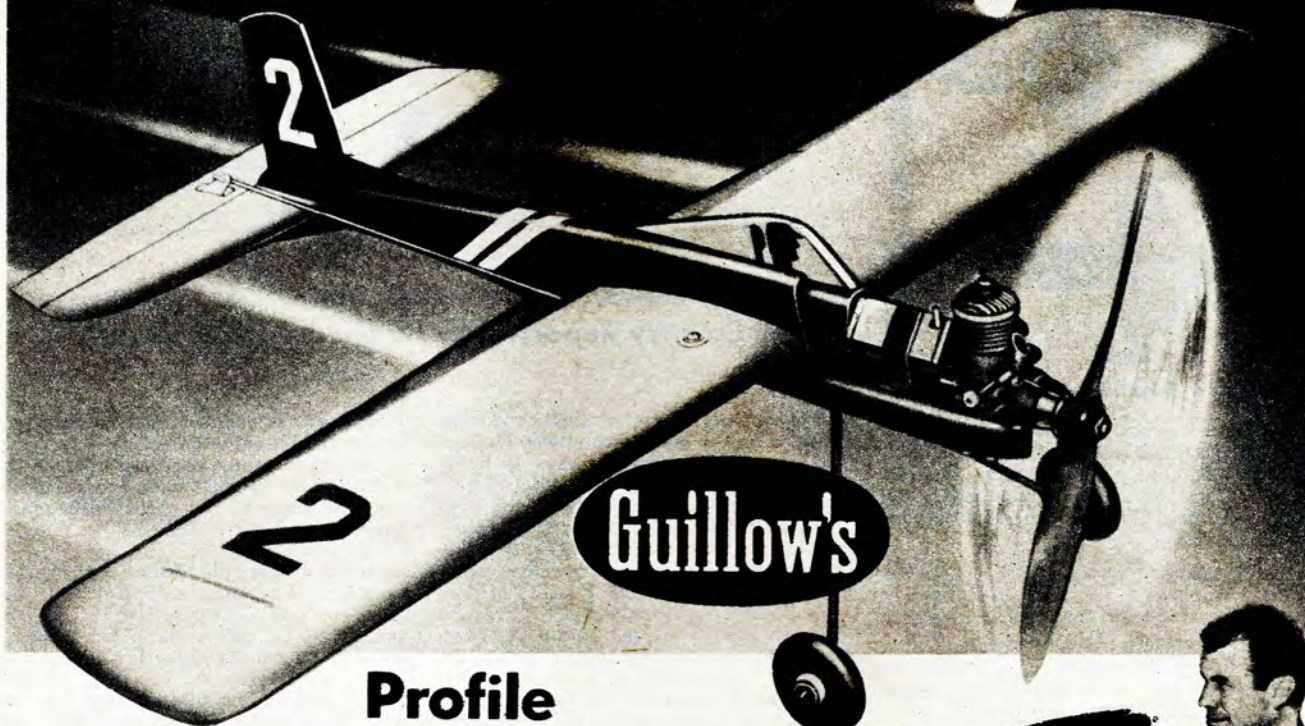
The Allen Pepperbox was the first successful American double-action revolving-barrel pistol. It became at once popular, especially among traveling people and "Forty-niners." Advantages of the Pepperbox were that it could be brought into action very quickly and, although not overly accurate, could fire six shots as fast as the trigger could be pulled.

The Allen Pepperboxes were made in four, five and six-shot models in varying sizes and calibers from .28 to .40. Barrels were from three to six inches in length. Many were supplied cased, complete with tools and accessories. These cases and extra tools were made for Allen by other manufacturers. A powder flask and cleaning rod from such a case are shown in the illustrations. The Pepperboxes were usually engraved on the frame, and since this was all hand work no two guns had exact-same designs.

The Pepperbox shown in the illustrations is stamped Allen & Thurber (one of the several names of Allen's company) and was made in Worcester, Mass., around 1848. It is 7¼ inches long, with a six-shot cast-steel barrel. It fired a .31 caliber lead ball. The end of the barrel was fitted with a nipple, or cone for each chamber. A shield fitting around the nipples and protecting caps when they were fitted on was fastened to the frame. This model has polished cherry grips, and sold in 1849 for about \$15.



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Major Charles E. "Chuck" Yeager

On Oct. 14, 1947, Major "Chuck" Yeager became the first man to break the sound barrier when he flew the rocket powered Bell X-1 at a speed of over 760 M.P.H.

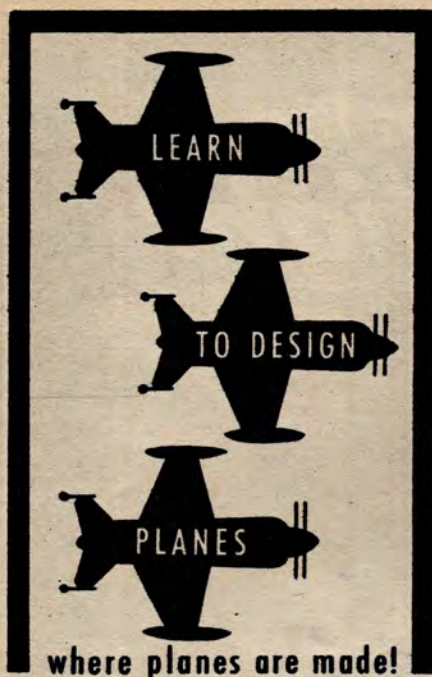
Again in Dec. of 1953 Maj. Yeager rode the bullet shaped Bell X-1A to a height of over 70,000 ft. and traveled at a rate of 1,650 M.P.H. — Mach 2.5 — two and one half times the speed of sound.

In the tradition of the Wrights, Rickenbacker and Lindbergh, the modern test pilot is pioneering new frontiers in the sky and Maj. Yeager is one of the foremost in this hazardous profession.

Thirty-two years old, Maj. Yeager, won his wings in 1943 at Luke Field, Phoenix, Arizona and went from there to France during World War II where he was credited with downing 13 German planes.

Upon his return to the states, he was appointed a U.S.A.F. test pilot at Wright Field.

Among the many awards won by Maj. Yeager are the MacKay trophy in 1947, the Collier trophy in 1948 and the Harmon International Aviation Award in 1954.



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News, Views, Comment on Radio Control Across the Country Reported by Howard G. McEntee, W2SI

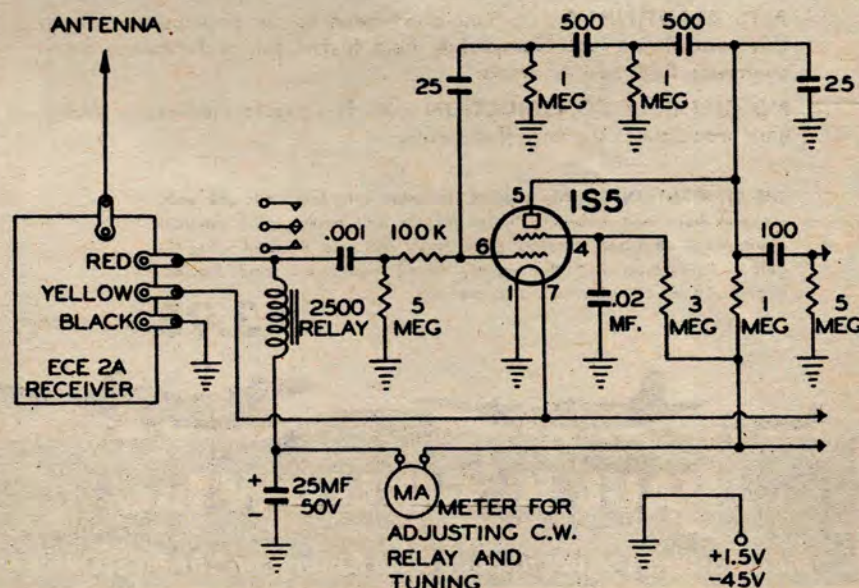
Multi-controls from a single receiver seem to be the goal of countless R/Cers, and they have countless ways of doing it. One unusual way was described in this column (p. 17, Feb. 1955) by Paul Johnson (1500 Arthur Ave., Des Moines 16, Iowa), who used two 27¼ mc. receivers working simultaneously. Since they worked quite well, Paul decided to combine them and make one R.F. section do both jobs. The final circuit is shown here, and consists of a standard ECE 2A receiver followed by an audio amplifier.

The ECE works the 2500 ohm relay in the normal manner, with a current change of 2 ma. When an audio tone is transmitted, the 8K relay operates, the current change here being about 3½ ma. The relays are entirely independent of each other, and with various combinations of carrier and tone on or off you can get all sorts of control action. In the setup Paul has, the rudder is operated proportionally by pulsing the tone, while a compound escapement working via the 2500 ohm relay and carrier-off kicks the elevator.

His motor control comes from the usual third compound position. When signal is cut off, the relay that works the

compound escapement cuts the power to the rudder actuator, which is arranged to return to center position. Sounds like a real practical system, and could probably be adapted to most single hard-tubers.

Oldtime R/Cer Bill Butler (8856 Earhart Ave., Los Angeles 45, Calif.) is also going for multi-control, but will do the job by use of receivers on two bands—28 and 50 mc. Says he is also hard at work on Hamblen's 220 mc. outfit—could he be going to stuff that into the poor plane too!? He hopes to put some of this apparatus in a plane which he had intended to use at the 1951 Nats, but which he is just now getting to fly the way it should. Bill says the LARKS (Los Angeles Radio Controllers) have two cups that are in competition each month; one is for single control planes, the other for the multis. Winner at each monthly contest gets his name engraved on the big cup, and receives a small one to prove his prowess. Top winner takes the big cup at the end of the year. Webb Hill—the timer and battery box man—won the single-control cup at the first 1955 competition.



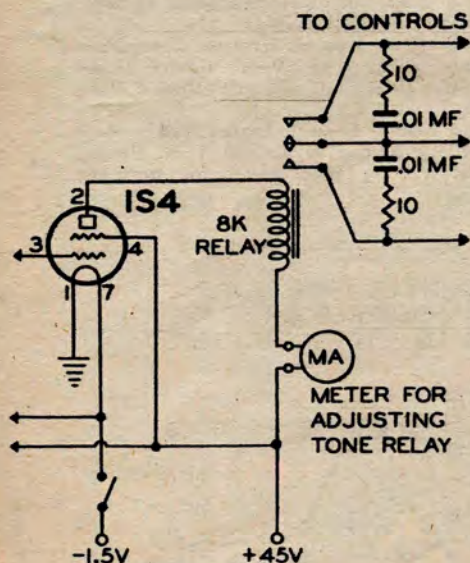
A different approach to the problem of persuading people to return flyaway planes to their rightful owners is suggested by Earl J. Lombard (51 N. College St., Washington, Pa.). As Earl notes, the usual system is to attach a card to the plane (if the flyer takes the time to do so!) with name, address, AMA number, and a note to the effect that finder will be popped in the hoosegow if he doesn't come across. Earl feels this is the *wrong* approach, and has had wandering planes returned several times which were equipped with a more gently worded placard. It reads: "This is a radio-controlled airplane under test. Should it become lost, please be kind enough to notify the 'builder.'" Then come name, address and phone number. At the end, Earl has: "Turn switch on left side to Off position. Plane will not harm you in any way."

You may feel the last sentence is not required, but we've heard of an R/C plane which was picked up by an ignorant individual and dunked under water, in the belief that it was a flying bomb! And in another case, the lost plane was gingerly carried on the end of long poles to an isolated building, and no one was allowed to go near the place till the owner arrived and convinced the citizens that the thing wouldn't suddenly go off and take half the town with it!

Earl uses a Mac II transmitter, and gives it credit for preventing what might have been some flyaways, but, as he says, it only takes one bum little soldered joint in the plane to lose you a ship.

Officer election of Pittsburgh Flying Circuits ended with Norm Tauberg as Pres., Joe Loyek the VP, and Maynard Hill the Sec.-Treas. Parties interested in R/C are urged to call Maynard at CH2-3815, or at 311 Long Hill Rd., Pittsburgh 35, Pa. Club is having a membership drive at present, and both beginners and experts are welcomed. This is the group which puts on the Annual R/C Invitational Meeting at Selinsgrove, Pa., each year, and Maynard says that plans are already under way to hold a bigger and better meeting at the same place in 1955—date is over the Labor Day weekend, as usual. A local R/C meet will doubtless be held during the coming season. Seems most everyone in the club is switching to proportional rudder, with a few of the advanced builders attempting to tie in elevator too.

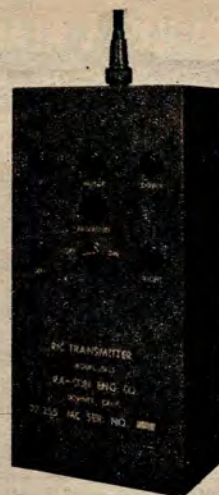
(Continued on page 68)



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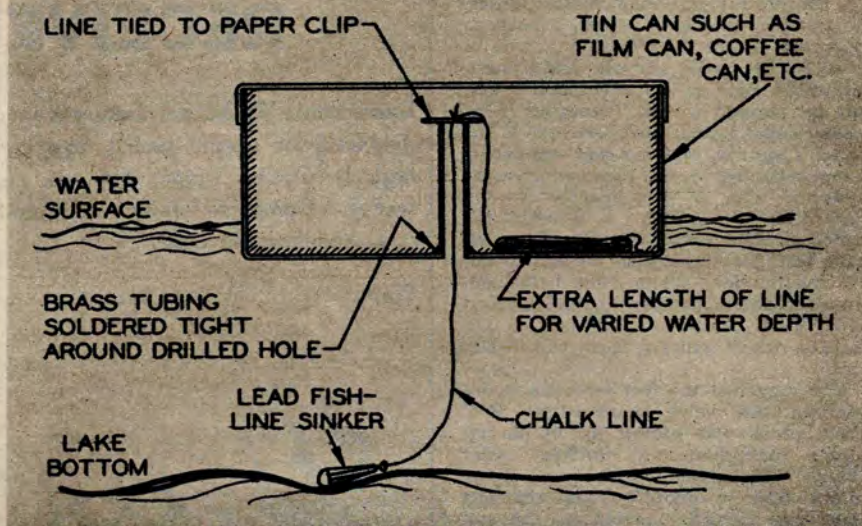


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■ The comparative lack of commercial water-cooled engines has led to a whole rash of home-made jobs, some of which have worked very well. One of the simplest ways we've seen to do this (shown below) is the work of Keith A. Barriagar (1518 E. Caro Rd., Caro, Mich.). He feels it is best with engines having aluminum cooling fins, such as the McCoy .09; slots were cut in all the cylinder fins except the top and bottom ones, the slots being on opposite sides of the cylinders, to allow for passage of the water. Then a piece of auto radiator hose, which had two small copper tubes forced into holes as shown, was pressed down over the fins. Keith also has a neat and simple flexible coupling that will handle plenty of power. Parts for this are fully detailed in the drawings; note that the engine half of the coupling holds the fly-wheel in place. This coupling is quiet in use, and makes it a cinch to remove the motor when you so desire.

Buoy for R/C Contests (above) is the work of Bill Baughman (3432 W. 43rd St., Los Angeles 8, Calif.). His group has held quite a few R/C Steering contests, and got tired of blowing up balloons, tying on anchor lines, etc. They obtained a quantity of old 35-mm film cans and rigged them up as we show. Some were painted red and some yellow, so that different courses (tough and easy ones) could be laid out. Anchor lines can be quickly adjusted for the depth of water, and when the buoys are to be stored, the anchor line of each one is just pulled up inside the can. Even though the cans are rather large, there has been no problem

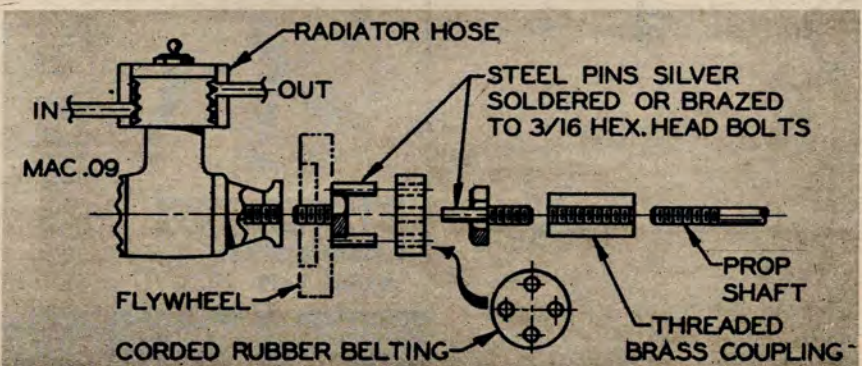
of damage when boats hit them. The cans float practically on the surface and the slightest push will displace them. A ring of soft material like foam rubber could be cemented around the edge of the cover for added protection, but the L.A. boys have not felt this to be necessary. Since the cans are low, they are not too much affected by wind.

New York Model Knights are active, according to news sent us by Bob Graham (127 Cottage St., Jersey City 6, N. J.). He says Henry Parohl has a new Class D boat and engine ready, and also a new 30 cc. engine which is an enlarged copy of Max Biederman's 10 cc. "Hell Razor." A new Traband-style hull is being readied by Fred Manderville, and by the time you read this these jobs will have been tried out, since the Knights officially opened their running season on April 3 at Kissena Park, Flushing, N. Y. At this spot they will hold record trials on May 1 and Oct. 9, and will run their Annual Memorial Race there on Sept. 11.

Bob says he had to break the ice on a local lake for a preliminary trial of his steam stern paddle-wheel boat; it paddled fine, so now he is finishing up the cabins and other details. He is also at work on new racing hulls.

A couple of other race dates to note: May 22—Philadelphia Model Power Boat Club race at Gustine Lake, Fairmont Park. June 19—Baltimore Model Power Boat Club race at Patterson Park.

2nd Annual Eastern States Hydro Meet will be held July 30 and 31 at Bristol, Pa. Will be bigger and better than last



year, according to Al Abrams Jr., who will again have a lot of the responsibility of making things run smoothly. Sanction has been applied for, and the date was purposely set at the end of July, so that it would not conflict with the National Model Airplane Meet, as was the case last year; many who went to the plane Nats would like to have attended the hydro doings. Meet will be sponsored by the Bristol Aeromodelers; for info write Al at 1031 Pond St., Bristol.

The IMPBA has big plans for the coming season, including issuance of books with complete power boat rules (which cover R/C contest events too), Association decals and lapel pins, etc. Trouble is, the program is bogged down for lack of money—and the money would be there if IMPBA members had paid their dues; dues are payable on the first of January. Let's get 'em in, so power boating can really get going. Also on the agenda is the appointment of Publicity Directors for all parts of the country. Bill Baughman is the only one who has been officially appointed so far, but announcements on the others are due soon. Get that cash in to Headquarters—2991 Garland Ave., Detroit 14, Mich.

New officers were elected for 1955, at January meeting of the SCMPBYA, and our faithful correspondent Bill Baughman went in as Commodore; V.C. will be Bill Price, with Roy Donovan as Sec-Treas. Lowell Lamb will be IMPBA Delegate (he is also Asst. Sgt. at Arms), while ex-Comm. Al Woods was kept in harness as Sgt. at Arms. Aside from the election, most of the meeting was spent in discussion of the upcoming L.A. Parks Dept. Model Boat Exhibition and Meet; the SCMPBYA was slated to supervise all power boat events at this Meet, while sail events were to be handled by the L.A. Model Yacht Club.

The Meet was a huge success, according to a detailed report sent in by Bill Baughman (who else?); held at Alondra Park in L.A., activity started about 10 a.m. Display tables encircling the basketball floor were crowded with every possible type, size and style of boat—everything from 8" to 8' long was there. It had originally been planned to hold free-running events in the morning, with the sail boys taking over in the afternoon when the wind came up; as usual, the weather proved onery, and morning wind made competition for the smaller free-running power craft impossible.

However, R/C was very popular, there being about 30 boats on hand, with actual competitors numbering 15. Excellent advance publicity brought out large crowds of spectators, and also contestants from every part of Southern California. R/C winners were: 1. R. Bennett (North Hollywood), 240 points. 2. A. Ferrin (Gardena), 230 pts. 3. A. Tonan (Gardena), 225 pts. Total possible point score was 250. Sorry to say, results of the sail events have not yet reached us.

R/C model yacht sailing is apparently centered in the Pacific Northwest, according to word we have from C. O. Davis (6521 Fremont Ave., Seattle 3, Wash.), who is Secretary of the Model Yacht Racing Assoc. of America, and thus in a position to know. Mr. Davis notes that they have generally found the R/C equipment used for plane purposes unsuited to yacht work and have therefore had to develop new apparatus themselves. We expect to have some concrete data for our readers on this subject soon, as well as more info on non-radio model

(Continued on page 83)

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Commemorative Stamps of the U.S.A. by Fred Reinfeld (Thomas Y. Crowell Company, 432 Fourth Avenue, New York 16, N. Y., 344 pages—\$4.50) is a compilation of stamps that tell the story of America. First issued in 1893, such stamps have increased in popularity ever since.

The early scenes tell the story of Columbus, his solicitation of aid from Queen Isabella, discovery of a new land, his triumphal return to Barcelona. Then followed the second and third trips, decreasing popularity and finally imprisonment. After this series came stamps paying tribute to the great explorers Lewis and Clark, then the colonists and their dogged struggle for survival against "hostiles," renegade whites and the relentless cruelty of the wilderness itself.

These special series are, with a few exceptions, still available at a cost not too much above their face value. Millions of Americans—many not stamp collectors in the true sense of the word—have saved these series.

From Flintlock to M1 by Joseph W. Shields, Jr. (Coward-McCann Inc., New York, N. Y., 220 pages—\$7.50) not only is a fine guide book for the small arms collector, but also an exciting history of the change in military tactics from the Revolutionary War to today.

The volume shows the development of the shoulder arms that were commandeered from the farmers, trappers and small boys—no two alike and few that could hit a barn door at fifty paces—into the automatic weapons in present-day use. At the time of the American Revolution the smooth-bore flintlock represented about the latest firearm. The relatively few rifles were scattered throughout the Colonies and so occupy a secondary place in the history of the Revolution. Some German and Swiss artisans familiar with rifling a musket bore took up residence in Pennsylvania; the product of their skill later became famous as the Kentucky Rifle. Around this gun many a tall tale has been told.

Later percussion caps were devised and with them greater certainty of firing, but a period of some twenty-five years elapsed before this innovation was accepted by the military. As a matter of fact slow acceptance by military leaders of new improvements in small arms has long been apparent. Perhaps one of the

classic examples is that after General Custer's command was wiped out at Little Big Horn, in his camp were discovered Gatling Guns (mechanically operated machine guns) which could easily have changed the tide of battle had Custer but deigned to use them.

Around 1850 the metal cartridge found popularity in America. Names like Remington, Winchester, and Sharps appeared on the American scene.

World War I showed that the striking power of the rifle could methodically chop enemy foot soldiers to pieces. Then the direction of rifle development changed from increasing striking power to increasing the rate of fire. The last chapter on new experimental rifles and the use of materials other than gunpowder for missile propellants gives the reader much to think about.

For the firearm hobbyist here is a book well worth having. It gives him accurate data on the shoulder arms developed in this country since its birth and tells as well the part each had in our nation's history.

Dogs and People by George and Helen Papashvily (J. B. Lippincott Company, East Washington Square, Philadelphia, Pa., 283 pages—\$3.95) describes with warmth and detail the relationship between man and his four-footed friend from the very beginnings of recorded history.

Not only in ancient but also in modern times has the dog served his master well, as is demonstrated by many an interesting anecdote that the authors tell. However, this book goes still further in helping the reader to choose the type and breed of dog which will make for an interesting and useful pet. Housing and feeding your dog are vitally important and many suggestions given in this volume can make for a healthier and happier animal.

This book although written for everyone—except those who have no affection for dogs—devotes the last chapters to the animal breeder. Many suggestions pertinent to selection of breed, location of kennels, raising pups and establishing boarding kennels are included.

Complete Boating Handbook by Robert Scharff (McGraw-Hill Book Company Inc., 330 West 42nd Street, New York 36, N. Y., 286 pages—\$4.95) is written

not only for the seasoned boatman but for the novice as well.

The author has covered a wide variety of hulls and powerplants, so the reader has almost unlimited choice in the type of craft which he can select for the waters where he will be navigating. The proper relationship between hull type and size and motor horsepower can save the novice many a headache as well as involuntary dunking. Pointers on the care and repair of motor and hull, rigging remote controls for smaller boats are worth many times over the price of the book.

The outboard cruiser, the newest member of the cruiser class, gaining greater popularity every day, provides the whole family with boating pleasure. Here are given basic rules for safety afloat such as fire prevention, first aid and artificial respiration. Every boat owner must be familiar with the rules and requirements laid down by the Coast Guard along with navigational aids like charts, weather maps and buoys. Various types of markers are presented in color drawings.

The chapters on family cruises cover everything from the equipment needed, from setting up a cruise routine to hints on planning a cruise for greater enjoyment. The last portion of this book describes and indexes information about lakes, rivers and coastal waters of each of the 48 states.

Airplanes of the World by Douglas Rolfe and Alexis Dawydoff (Simon and Schuster, 630 Fifth Avenue, Rockefeller Center, New York 20, N. Y., 319 pages—\$2.95) is a complete history of heavier than air flight from Leonardo Da Vinci's ornithopter in 1490 to the currently operative jet delta winged aircraft.

The book has been sectioned into nine chapters, each dealing with a definite age in flight development. A complete history of performance and peculiarities accompanying each drawing makes for extremely interesting and informative reading.

Year by year the reader is taken through the evolution of airplane design from the flimsy cloth-covered racks, pusher-powered, to the sleek supersonic types of today. Some 843 craft have been illustrated and lucidly described.

Here at last we have a complete history of the airplane in an ideal book for the model plane builder and aviation enthusiast, well indexed for ready reference and moderately priced.

Relativity for the Layman by James A. Coleman (The William-Frederick Press, 313 West 35th St., New York 1, N. Y., 131 pages—\$2.75) is written in simple terminology to explain the famed Einstein Theory.

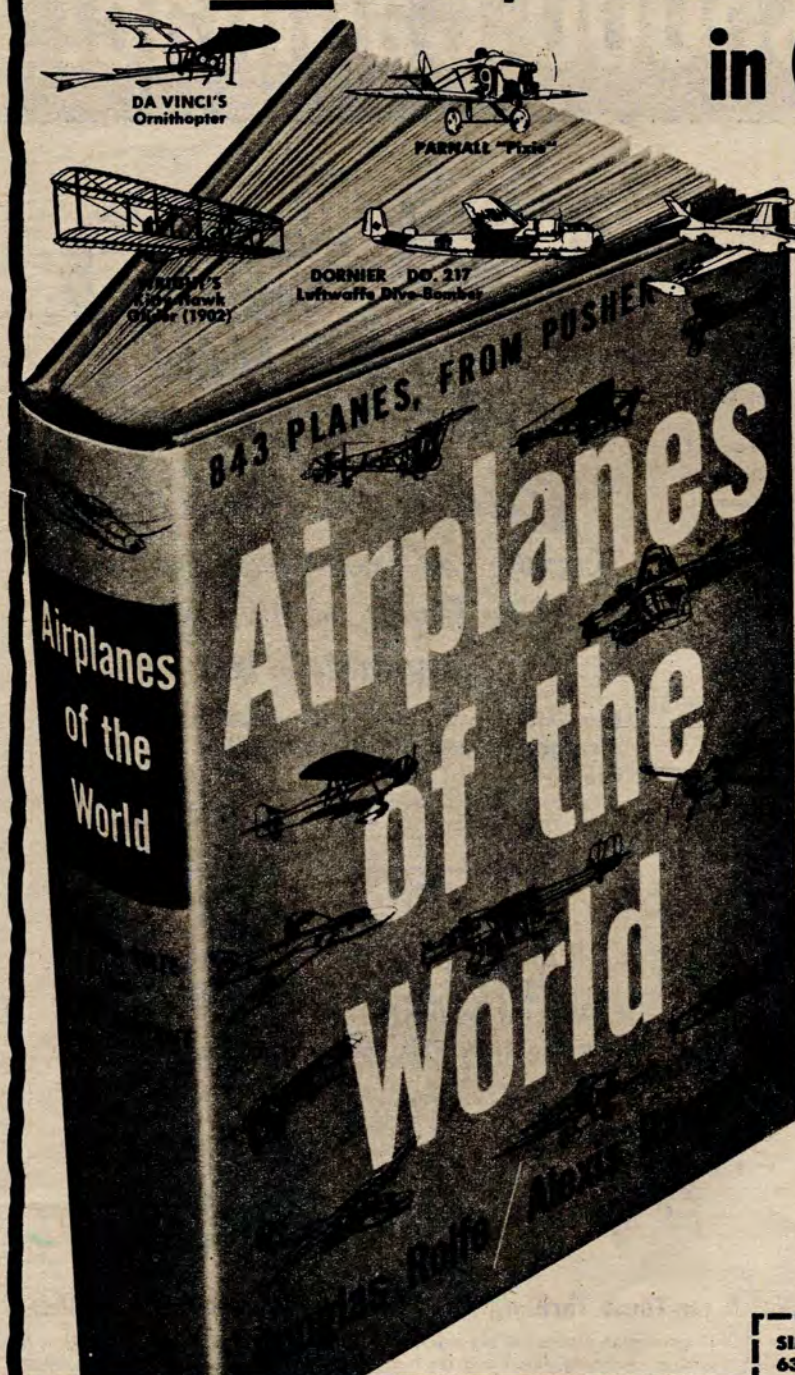
The author leads the reader through the history of the determination of the velocity of light by such men as Galileo, Hertz and Morely. In the process of these experiments ether was believed to be present. Yet a contradiction of this belief was prevalent because all efforts to prove the presence of ether had failed.

At this point of scientific frustration a simple explanation was given by the genius Albert Einstein in his Special Theory and eleven years later in 1916 he propounded his General Theory.

Simple mathematical formulae and amusing drawings by the author guide the reader to understanding of the Theory and make more credible its predictions. Then the unified Field Theory is introduced, presenting the reader with a real skull breaker. To go down in local history all one has to do is to explain the underlying principles of all the laws of the universe. This book lets you do it.



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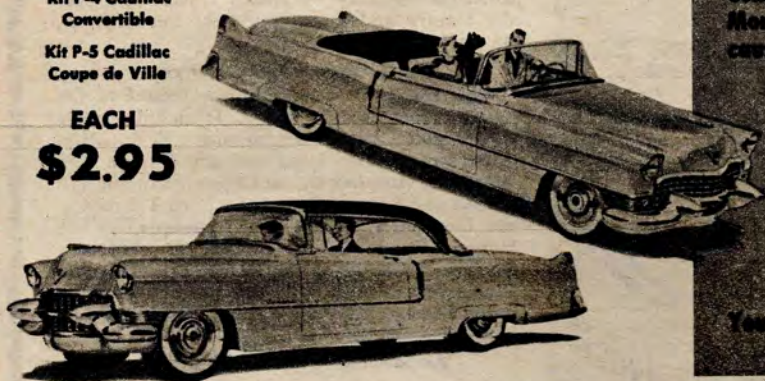
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Speaking of HOBBIES

THE MEDIAN MODELER

We've been learning some very interesting things about you, friend reader, through an extensive survey-by-mail made of ATH Reader Research Panel members. You may recall that some months back the Panel was set up. From among the many volunteering to serve on it "all applications were first sorted into 49 cells (48 states and the District of Columbia)"—this is Street & Smith's Research Department reporting. "Applications in each cell were then divided into subscribers and newsstand buyers; within each of the 98 final cells panel members were chosen at random in a number proportionate to the cell's percent of the total United States circulation."

Wow, that sounds real research-y, doesn't it? Bet when you volunteered to serve on the panel you didn't figure you'd end up in a "cell." In its final form the panel contains 914 members and is considered to be the most representative group of hobby-modelers ever assembled.

So—out to the 914 RRP'ers went a lengthy 5-page questionnaire with about 84 questions covering all phases of modeling, hobby interests, family size and income and so on. You know what? At the time of tabulation 71.7% completed questionnaires had been returned. While the figure may not be particularly significant to you or me, to research folks it is phenomenally high. So here's a big "thank you" to the Panel for responding so quickly and in such great numbers.

Not being too handy with figures we let the research folks compile all the data; it's their business and they know how. So it was from them that we found out you can get various answers from the same set of data. For instance, suppose we're compiling the ages of 5 Panel members. One fellow is 10 years old, let's say, another 15, next 25, then 45, and finally 85. If you add those together and divide by 5 the "average" age is 36 years. But the more correct and representative figure is the "median" age which is 25 years; in other words, the age that is midway in the group you are considering. It's the accredited system of adjusting so that the guy with all the years, or all the bucks, or all the model engines, doesn't overshadow the run-of-the-mill enthusiast like you and me. We soon found out that developing "median" figures is a lot harder and takes a lot more time than striking off an "average." But after what we've seen from this ATH Reader Research Panel survey, we're sold on median answers instead of more common but frequently misleading averages.

So much for the background of who supplied the data and how it was compiled. Take a look at the figures—really interesting:

- ▶ ▶ ▶ ▶ ATH readers have 21,438 brothers aged 10 to 17 years! Now there's one we never thought of—leave it to those research fellows!
- ▶ ▶ ▶ ▶ ATH readers spend annually on hobbies \$8,822,000! Your median family income is \$5,480—that's \$1,590 above the official national figure!
- ▶ ▶ ▶ ▶ More than 44,900 of you are currently in radio control work or indicated that you intend to get active.
- ▶ ▶ ▶ ▶ Collectively you built 1,045,000 model airplanes in the past 12 months and 237,000 model boats. And you've got lots of specific suggestions for kit manufacturers and the makers of accessories and special fittings.

More of that next issue.—A.L.L.

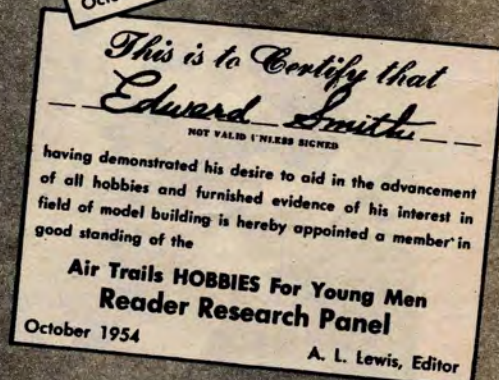
STREET & SMITH PUBLICATIONS, INC.

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MAY, 1955





The cobbler, though he had a shop in town, often called on customers at their farms and stayed there until the family shoe needs were met. Rough boots were made from cowhide, women's and children's shoes of calfskin. Average price \$3, less if customer supplied leather.



One of the lost crafts of "the good old days" is that of wheelwright, who made the wheels for farm wagons as well as for carriages of the rich. Here a metal strip which encircles the wooden wheel is being hand rolled until it acquires the necessary length and thickness.



Each little town had its own cabinetmaker who built practically all the furniture in the community. These craftsmen hand-fitted every part, using minimum of glue and nails. A standard practice was to join with dowel, threaded as by above operation.

The cooper made butter tubs, soap buckets, churns, kegs and barrels—everything that was round and hollow requiring the use of staves and hoops. There were "loose coopers" who made barrels for flour or meal, "tight coopers" who turned out barrels for liquids.



YOUNG MAN'S WORLD

"So—those were the good old days!"

■ "Things were really made to last then" is a comment often heard from the lips of the older generation. But there was a reason for it. Back in the early 1800s when our grandfathers were building up the country, factories did not exist, mass production was unknown. A new nation needed furniture for its houses, wheels for transportation, tubs and firkins to hold foodstuffs. These were made by a handful of craftsmen who were already hard pressed to supply commodities in sufficient quantity for everybody's immediate requirements. The articles, therefore, had to be made to last; replacements were difficult to obtain. Individual craftsmanship flourished. Gradually, however, because of increasing demand, artisans of the same trade joined hands in order to produce more goods faster, and an industry started to develop. These early crafts are now preserved in the unique Farmers Museum at Cooperstown, N. Y., where trades of bygone days, like the tinsmith's, the broom maker's and many others are on dramatized display.

Today, wood turnings can be bought ready made, manufactured on automatic wood-turning lathes. In those days, each piece had to be done separately, requiring the services of a skilled carver. The lathe was a crude foot-operated affair, the carving tools were hand-held.





To turn the skin of an animal into leather, the tanner used the bark of the hemlock tree for curing instead of present-day chemicals. Shown here is the harness shop at the museum. The young fellow on the left holds a "beaming block" which scraped hair off the skin.



George Campbell, associate curator of the Farmers Museum, demonstrates some of the equipment used by past-century glove makers. In his hand he holds a special die which, when pressed down on the leather, cuts out shape of entire hand. Wooden hand form on bench.



Even hats were locally made, especially in New England. The hatter blocked out beaver or rabbit felts on special forms to fit the individual shape of his customer's head. He also wove sun bonnets for farmers' wives, examples of which can be seen hanging on walls.

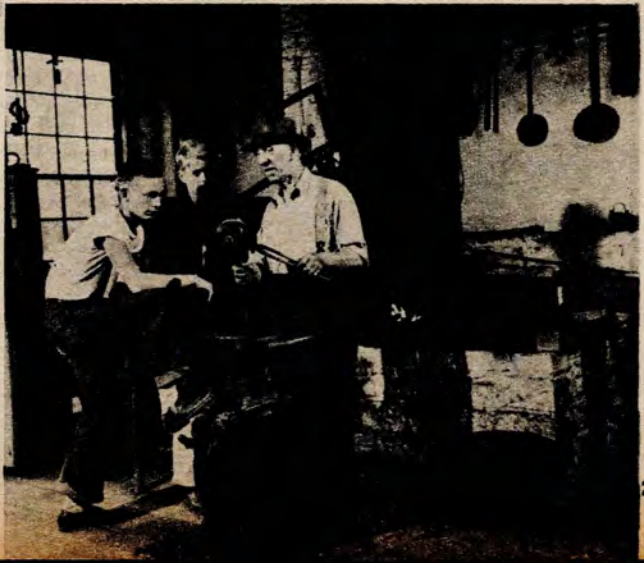


Shingle making was either a craft or an occasional occupation for the farmer. Young pine or chestnut constituted most frequent material. The wood was cut early in the spring before the frost was out. After a piece was cut from block it was held in horse and shaved.

The printer was a highly respected member of the community, for he not only published the local paper, but handbills and notices of such events as auctions, sales, social affairs, and personal cards. Though crude by present standards, his equipment was efficient.



One of the most important members of a rural town was the blacksmith. As metal craftsman he could shape most anything, from a horseshoe to a wrought-iron fence. He was a repairman as well as manufacturer and his trade demanded a very high degree of skill.





RADIO CONTROLLED

Skydelta

By DONALD C. BROGGINI

More than two years in development stage, this delta can also be flown as free flight sport

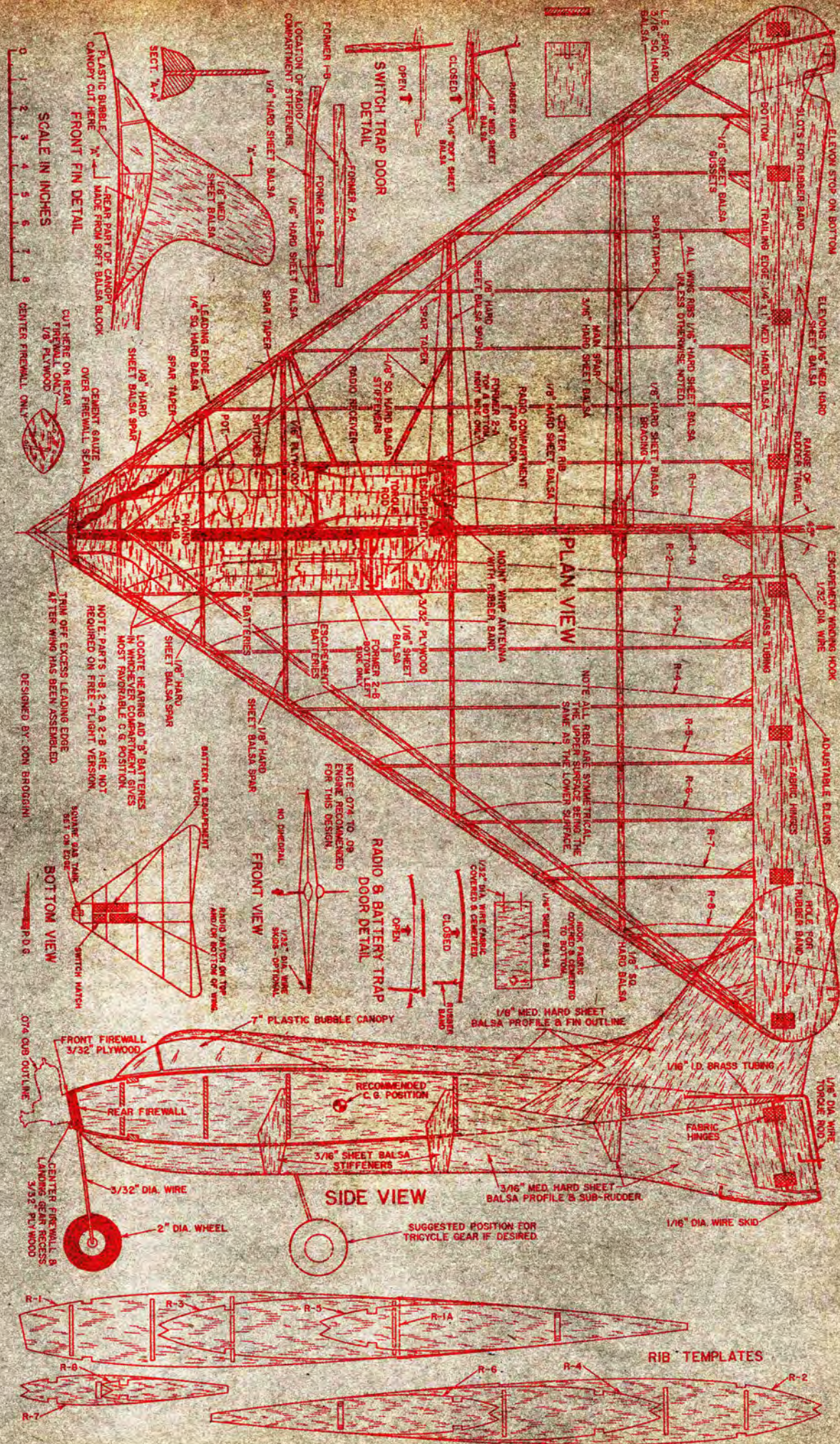
■ The delta shape has established itself in the aviation world. Now here is a radio-controlled delta with a rakish, modern, realistic look to it. The craft, powered with an .075 to an .099 cubic inch motor, weighs 24 ounces with all radio equipment ready to fly. A good .065 will also prove satisfactory. If it is desired to be tried as a free flight without radio, any .049 motor will provide ample power.

Skydelta is exceptionally rugged and warp resistant (the delta shape is ideal in this respect); it has plenty of room for radio equipment. Leading edge, spars, and ribs unite in a strong geodetic-type structure, further lending exceptional strength and warp resistance. The plane

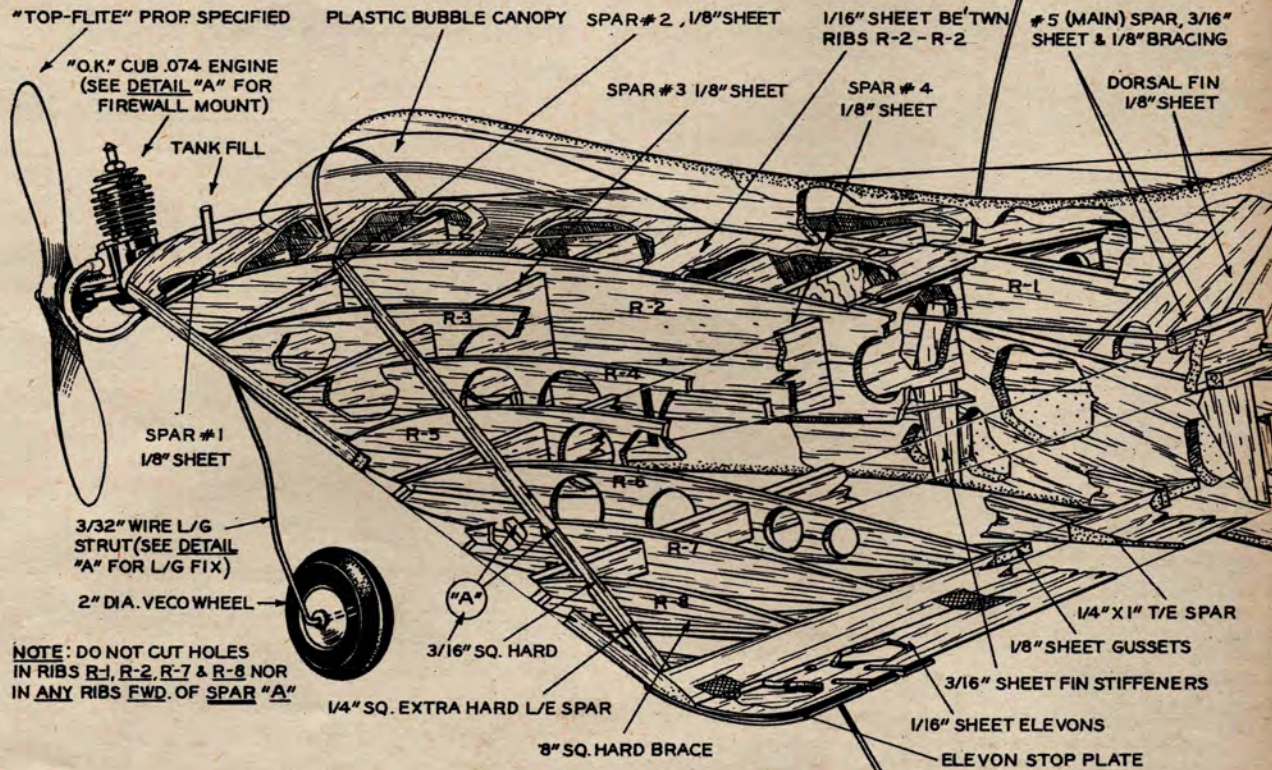
has cartwheeled, spun into a road, hit a pile of rocks and taken other assorted hard knocks with only superficial damage. The photos, incidentally, were all taken after these adventures.

Skydelta is the result of a development of a series of deltas. First a number of small balsa gliders were made from which a few lessons were learned, and later substantiated in the full-size model. Then came Jetex-powered deltas followed by a 2 ft. Infant powered free flight of various configurations; our 3 ft. radio job was next.

The craft has a number of interesting features. It is just about impossible to stall the ship. The airfoil is essentially



Radio Controlled SKYDELTA



symmetrical to prevent adverse center of pressure travel and to insure good longitudinal stability. The slightly raised elevons give both reflex effect to the airfoil for stability, and since each increases in chord towards the wing tip, they also give a washout effect to delay tip stall. These desirable results are obtained without having to build or twist reflex into the structure of the wing. The plane has no dihedral since sweepback accomplishes the same thing; it is ideal for sustained inverted flight since the dihedral effect continues although the model is upside down.

The movable rudder is under the wing to insure effectiveness at extremely high angles of attack when the wing tends to blanket out part of the upper rudder. Quite maneuverable, *Skydelta* does not drop its nose in a relatively tight turn.

For those interested in one of the more

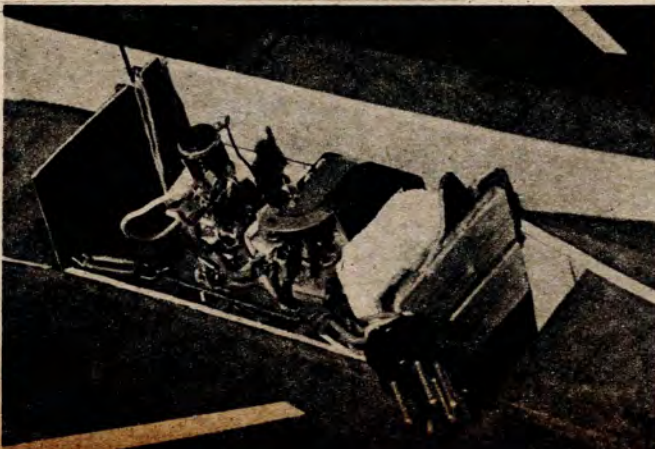
technical aspects of the development of the plane, it might be mentioned that the initial R/C job exhibited some lateral stability deficiencies. These were corrected but under certain extreme conditions of high lift coefficients (generally with a rearward C.G.) there was a snaking tendency (similar to a Dutch roll) so characteristic of the highly swept wing. Full-size planes use a complicated system called a yaw damper to stop the yaw almost the moment it starts. Other remedies are to limit the angle of attack at which the plane flies, increase the fin area, or move the C.G. forward.

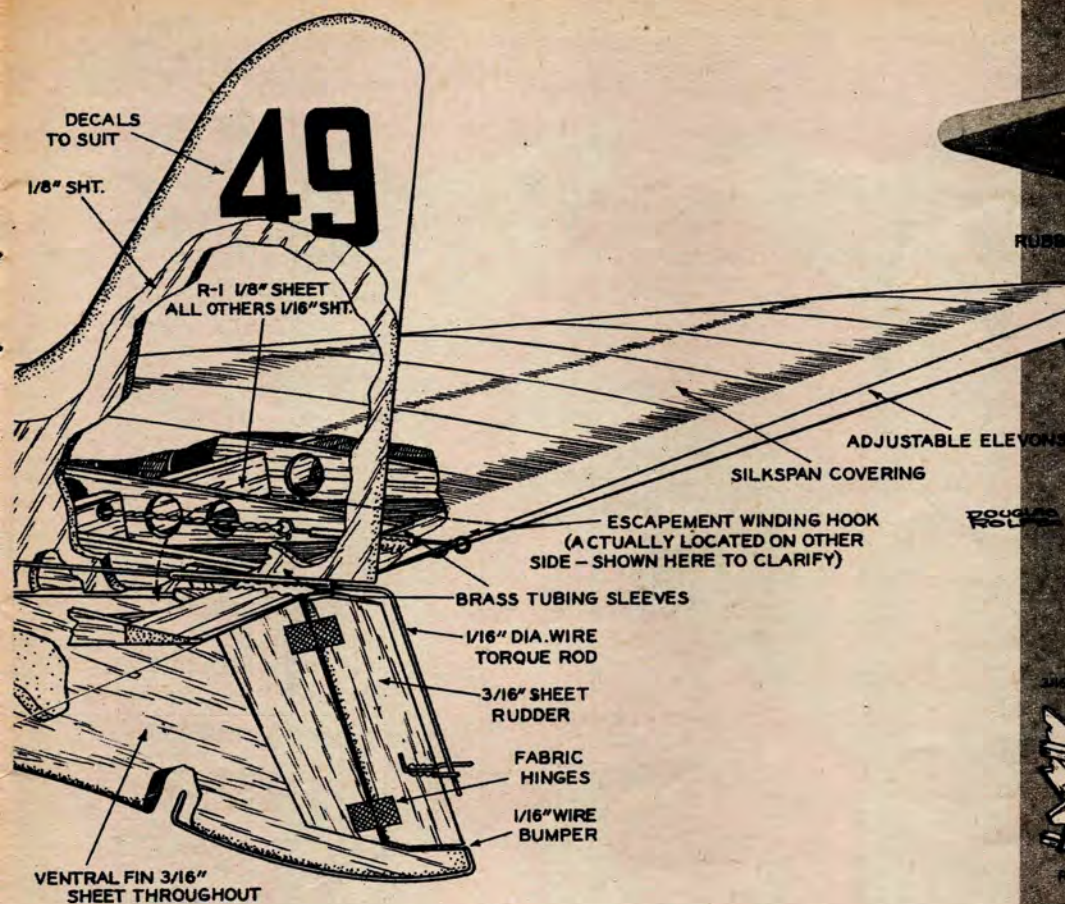
While the snaking was small and did not affect flying qualities in any way, we wanted to eliminate it. The C.G. was changed and the rudder area was varied by large amounts; various combinations of a rudder under the wing, one, two, and three rudders on top of the wing made

little difference. Then the present fin configuration was developed. The plane was modified, adding the long dorsal fin above and below the wing, retaining the highly effective lower fin and reshaping the upper fin. Rudder area was actually decreased by a large amount over that on some of the previous configurations. This did the trick, proving very effective, and also improved the plane's characteristics in a turn.

It is very important to select three hard pieces of very *straight* wood; the two leading edge pieces of $\frac{1}{4}$ " square and the $\frac{1}{4}$ " x 1" trailing edge piece. Construction can be in the conventional manner of pinning down the structure to a flat surface if both the wing ribs and spars are first split lengthwise. The upper half of the wing is built and when dry it is removed from the working surface and then the lower part of the spars and ribs

Wing is almost 3 inches deep, providing ample room for radio equipment. Plane has no dihedral—sweepback accomplishes same thing.





are glued to the structure.

However, it is suggested that the wing be built with "whole" ribs without the bother of pinning down the wing pieces to a flat surface. To do this first join the straight leading edges and trailing edge in their triangular shape; have the bottom surface of the trailing edge at the correct angle since this determines the elevon angle. In other words the top surface of the trailing edge is just about horizontal.

Next cut rib #1 from hard 3/32" sheet or medium 1/8" sheet; let it extend at front to butt temporarily against each leading edge. Cement securely. (The apex formed by the leading edges and rib #1 is cut off later in order to add the firewall.) Let dry. Follow the grade wood specified since the weight of balsa can vary by a factor of more than 3; this can add a significant amount of needless weight.

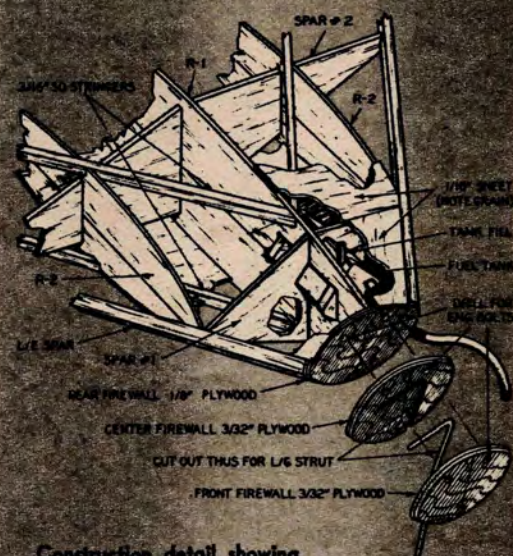
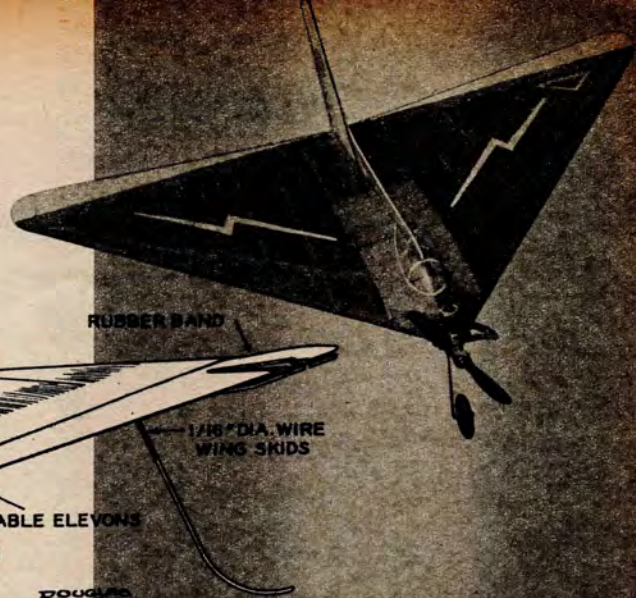
Now add the wing spars made from medium 3/32" sheet. Use 3/16" hard sheet for the rear spar. Only the rear wing spar is spliced. The others are glued well where they butt into rib #1. Let dry, and cut out the wing ribs from medium-hard 1/16" sheet balsa. These are cut lengthwise down the middle so that they may be placed over and under the spars. Cut lightening holes in those ribs (to save weight) indicated on cut-away drawing. Add 1/8" square rib stiffeners to the upper and lower edges of rib #2 on the right side only as shown on the plans.

The hard 3/16" square spar going from rib #1 to the wingtip may now be added to the top and bottom surface of the wing. Cut notches in the ribs to receive this spar. If hard balsa can't be obtained in 3/16" square then use hard 1/4" square.

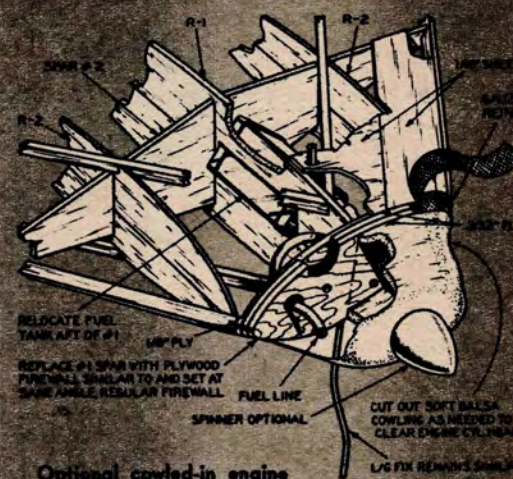
Upper rudder of hard 1/8" sheet is added. The long upper dorsal fin of soft 1/8" sheet is installed later. The lower fin ties into the wing spars and trailing edge with vertical pieces of hard 3/16" sheet with the grain running vertically. The remainder of the lower fin has its grain approximately horizontal and is made of medium 3/16" sheet.

Elevon stops of hard 1/16" sheet are glued securely to the bottom of the trailing edge. The elevons made of hard 1/16" sheet are mounted to the trailing edge with gauze hinges. The elevon is held against the elevon stop with a rubber band, thus permitting a small shim to be wedged between them for flight adjustments. The rear firewall of 1/8" plywood may be added after trimming off the nose of rib #1 and the foremost part of the leading edge, as shown on the plan. The nosewheel landing gear is now mounted by sandwiching it between the three plywood firewalls.

Mount the engine; solder nuts to piece of tin before mounting on back of firewall. Add the gas tank in the nose section. If necessary to cut out part of rib #1 to install the gas tank, reinforce rib in area of cut-out. (Additional building details on the full-size plans.)



Construction detail showing conventional firewall assembly.



Optional cowled-in engine shows modifications.

Full-size plans for the Skydelta are on Group Plan #455 from Hobby Helpers, 770 Hunts Point Ave., New York City 59 (50¢).

Grumman F9F-9 Tiger



Speed's the thing with 10' utility racing pram by Chris-Craft. Additional equipment has been included for racing.

Pug-Nose Racing Pram

Beautifully proportioned for miniature glow plug outboards is this model of popular Chris-Craft

By WILLIAM A. "BILL" BAUGHMAN

■ Here's a model outboard boat you can start Monday night, have completely finished during the week without working hard and run next weekend at the lake. How much is involved? Two sheets of $\frac{1}{8}$ " medium balsa, small piece of $\frac{1}{8}$ " plywood, an old block of pine or similar weight wood, some cement and finishing material—about \$1.00 to \$1.50 tops, if you don't already have the stuff around your workshop.

Don't let this low cost fool you, though; this job performs beautifully with the Half-A glow outboard engines. It is a semi-scale model of the Chris-Craft 10 ft. Racing Pram shown in the accompanying photo and should qualify for any organized model outboard racing.

Start by making full-size patterns of all parts. Use a good stiff manila folder stock, or similar; work carefully and you will be able to build several boats from the one set of patterns. Trace all patterns on the sheet balsa, with the exception of the stern transom and front deck block. Use the $\frac{1}{8}$ " plywood for the stern transom and the sugar pine block for the front deck. Cut out all parts carefully.

The hull of this boat is constructed upside down, so a good building board

is a necessity—any flat piece of wood approximately 8" x 16" will do. Mark a center line on the building board, as well as for the transom and all frame cross positions.

To start actual construction, cement the two keel doubler pieces to keel and bow knee in position shown. When dry, assemble hull framework by inserting frames #1, 2, 3, prow, and transom in proper place on keel assembly, and placing upside down on building board. Take time at this stage, lining up the parts and fastening securely to building board with pins. When checked, cement all parts.

After material in framework step above has dried, fasten both sides—side panels—in place after first pinning to framework and building board. If your balsa is rather stiff this step can be done in stages by first gluing both panels to bow plate, then to frame #3, frame #2—allowing cement to dry each time—and gradually working other ends over frame #4 and finally the transom. Cellophane tape works very well in holding the parts in position while bending.

Next, true up bottom of boat and taper front edges of ribs, with light sandpaper on large block of wood to assure

a bottom planing surface free from bumps and hollows. Be sure side panels are sanded to shape of ribs on bottom. When ready to start fastening bottom panels, first remove all pins and any excess glue that has been holding hull to building board, for it will be rather difficult to do this after applying the bottom.

Now spend some real time fitting the panels so that centers will meet the whole length of boat and entire bottom will be covered, then cement in position. You can start at bow or transom end, whichever suits your fancy.

Your hull is now completed. Sand it thoroughly with light sandpaper and trim off any rough spots. Bottom panels should be sanded neatly to side panel contour.

Turning the boat over, glue sugar pine front deck block, previously rough-shaped, in place, add false prow (frame) and sand to finish shape when dry. Do not substitute lighter material or hollow deck because this bow weight is needed for proper running trim. Install transom knees and bottom transom braces and place mid deck beams and doublers and covering in place. Finish off by fitting coaming trim in position,

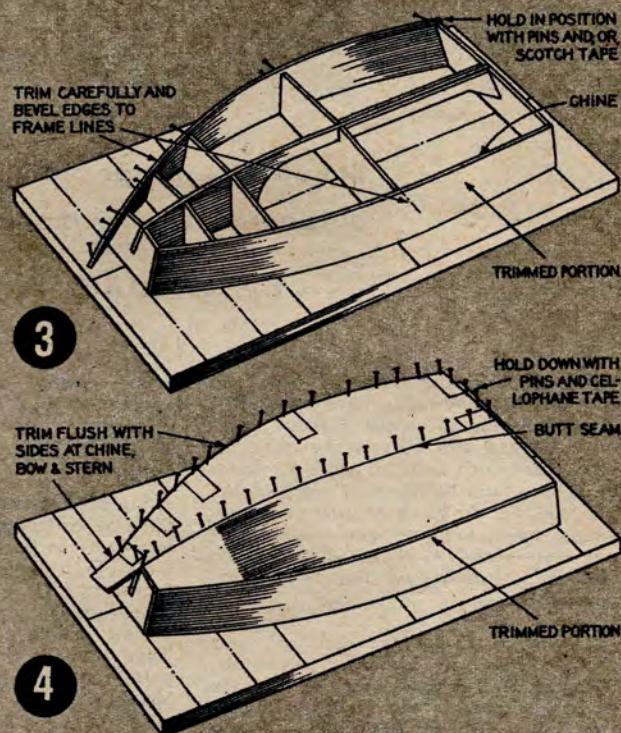
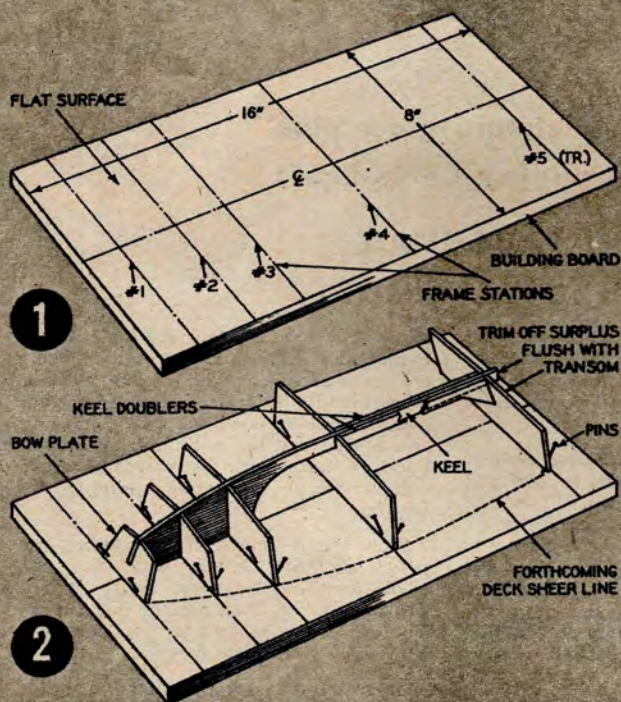
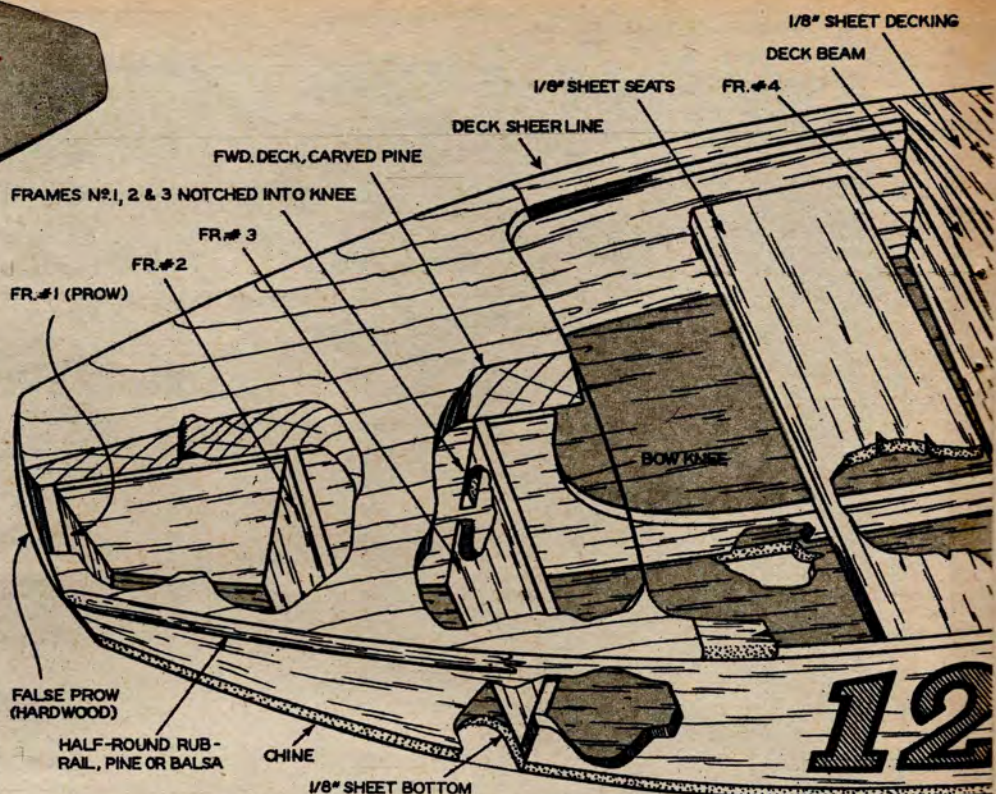


PUG-NOSE RACING PRAM

if desired, and sand whole top to smooth contours when dry. Use photo as guide for these particular pieces and fit to your boat.

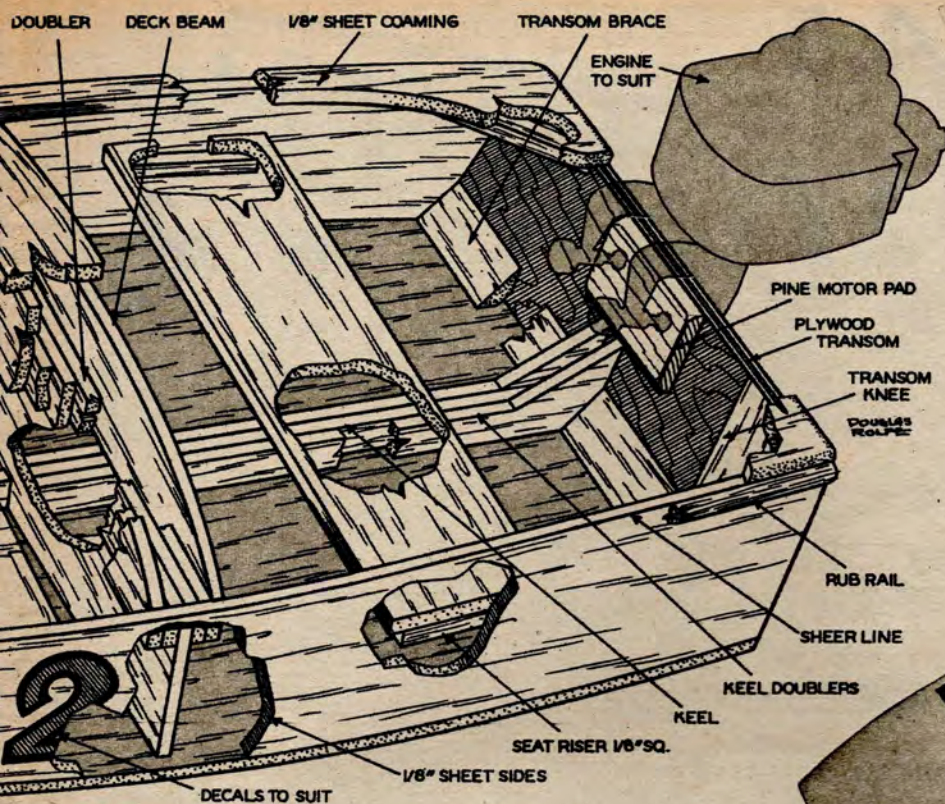
To add more realism, seats may be fashioned from scrap $\frac{1}{4}$ " sheet. Make them $1\frac{1}{4}$ " wide and long enough to fit your boat at approximate point shown. For strength, you should also install the $\frac{1}{8}$ " x $\frac{1}{8}$ " seat risers. A $\frac{1}{8}$ " x $\frac{1}{8}$ " balsa rub-rail can be installed in position shown in photo. Round edges slightly.

Full-size plans for Pug-Nose Racing Pram are a part of Group Plan #555 available from Hobby Helpers, 770 Hunts Point Ave., N.Y. City 59 (50c).



The four simple steps involved in building "Pug-Nose's" hull are illustrated in these sketches. 1. Mark off suitable work or building board as shown, laying out center line and all frame stations with a straight rule and with heavy black pencil. By laying out all frame stations you insure good alignment of these vital members to the hull structure. 2. Assemble keel and keel doublers, fit frames, bow plate and transom in their respective notches and set up as shown on work board. The job you do on the alignment at this stage will establish a good or badly formed hull, so be careful here. 3. Bend and fasten the side planks as shown after first beveling frames to a good fit at each frame.

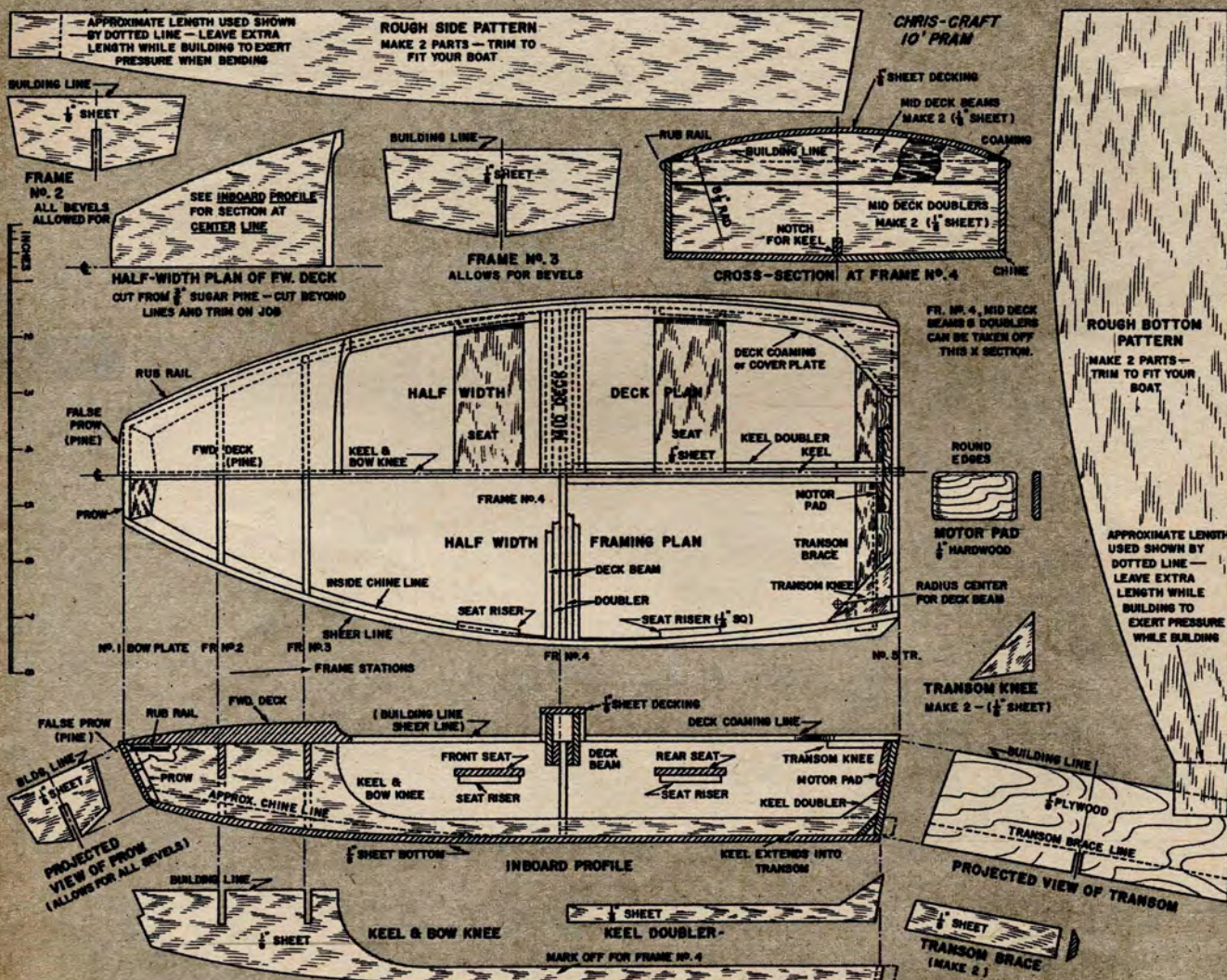
Use small pins plentifully to hold work while drying. If necessary use Scotch (cellophane) Tape to assist the fix. (Steaming side planks well before placing in position will be found helpful at extreme bends.) Trim and bevel chine edge of planks to conform to frame sections. 4. Cover bottom in two sections, butting each piece on dead center of the keel. Scotch Tape is of definite advantage here to tie down and bind the bottom planking firmly and evenly to the framing. Trim off excess material and sand flush with the lines of the side planking. Your hull is now ready to be lifted from the work board, and the seats, decking and coaming boards may be installed.



Use your own imagination or past experience as to putting on an attractive finish; but by all means use a fuel-proof product throughout. A couple of coats of sealer, sanded between coats, followed with about five coats of finish dope should do the trick.

Clamp one of the glow-plug model outboard engines on the transom. Head for the nearest lake that has room to spare. Set the engine for a large circle and let 'er go. We bet you'll build a couple more of these little prams after you see how this one performs!

As free running scale model "Pug Nose" can be plenty of fun. Always "tie" motor to boat with safety line which is firmly attached to framework. Boat circles by turning motor.



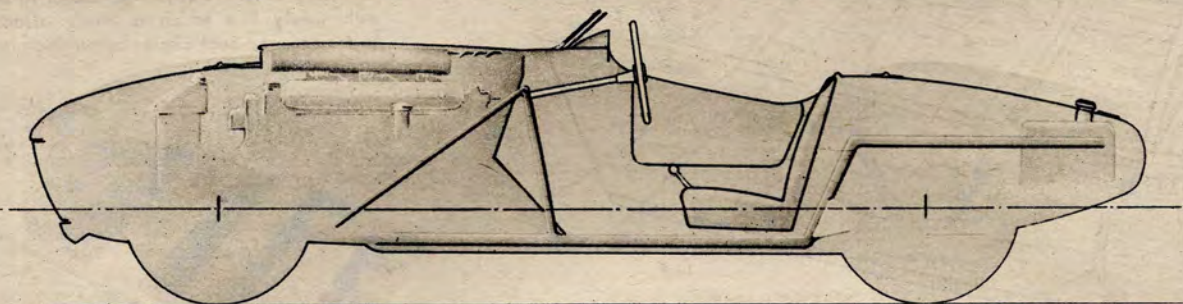
AUTO

Progress

BY JEFFERIES

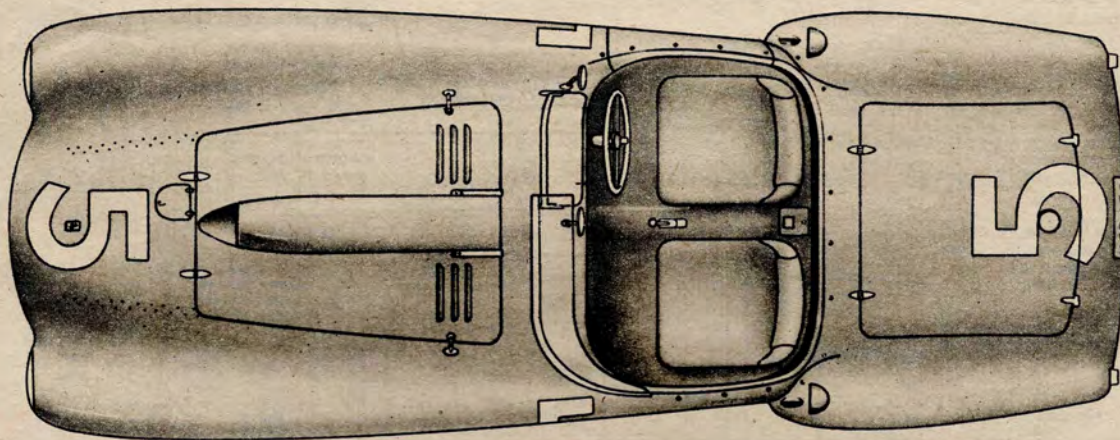
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Ferrari

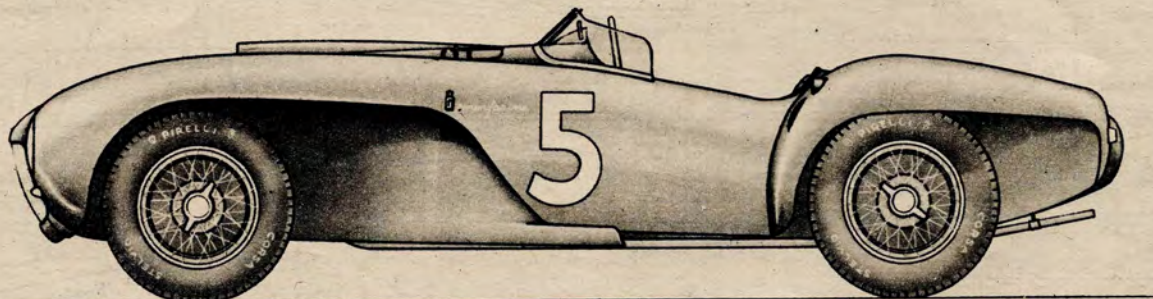


LONGITUDINAL SECTION AT CENTER LINE

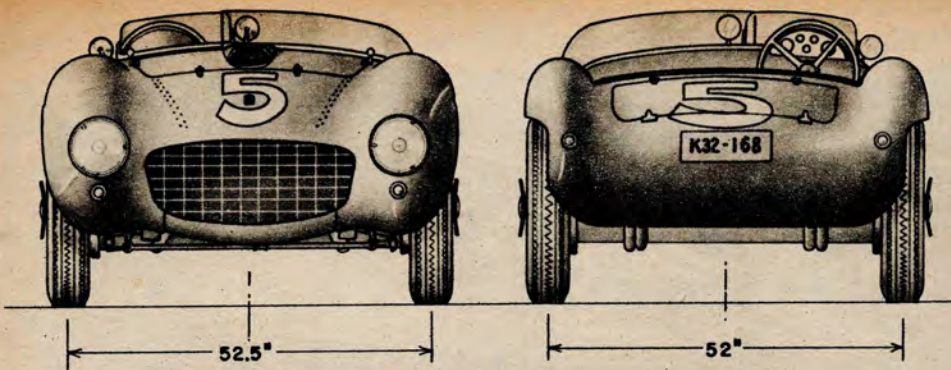
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JEFFERIES



102"



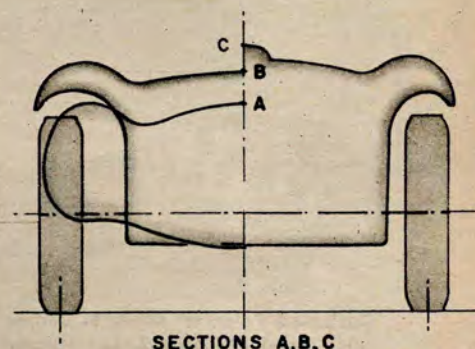
In the hands of Jim Kimberly, all-red No. 5 was reigning king of American sport racing

■ The name Ferrari has been synonymous with car racing in Europe since long before World War II. In the days when Nazi racing teams vied for laurels on race circuits of France, Italy, England, Germany and Czechoslovakia against the flaming red Italian cars, the Scuderia (stable) Ferrari of Alfa Romeo racing machines was the only threat to the Mercedes and Auto-Unions of Germany. Today, Signor Enzo Ferrari builds his own. The rearing black horse, emblem of the team, which originally decorated the Ansaldo fighter of Italy's greatest World War I ace Major Francesco Baracca now adorns the hood of a series of cars that have proved themselves practically unbeatable, whether at the 24-hour Le Mans or the gruelling 2000-mile Mexican road race.

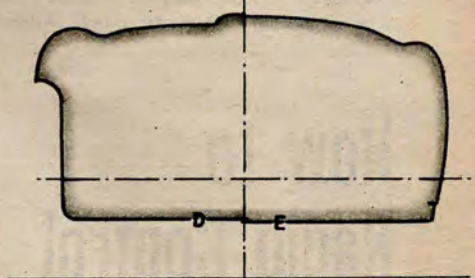
David R. Allen photo



The classic example of the Italian rocket is the 4.5 litre displacement Type 375, illustrated here, with which the Chicago industrialist James Kimberly won 10 of the 13 Sports Car Club of America national races last year. Powered by a 12 cylinder V-type engine of 270 cu. in. capacity (about the size of a V-8 Pontiac), it develops 295 hp at 6500 rpm. The car, weighing 2100 lbs., has a top speed between 155 and 174 mph depending on the rear-end ratio used. Its neck-snapping acceleration is almost unbelievable; from stand-still, 100 mph can be reached in less than 15 seconds. Driving an identical twin at Andrews AFB Sports Car Race at Washington, D.C. in May, 1954, William Spear of Greens Farms, Conn., had the distinction of winning the Presidential Cup. But Ferrari does not limit himself to the construction of sport-competition cars. Yearly he makes 200 automobiles, some elaborate, streamlined coupes with bodies by famous Italian coach builders and powered with a variety of engines between 160 and 300 hp, and others that are out-and-out racing machines, the Grand Prix cars, capable of speeds close to 200 mph.



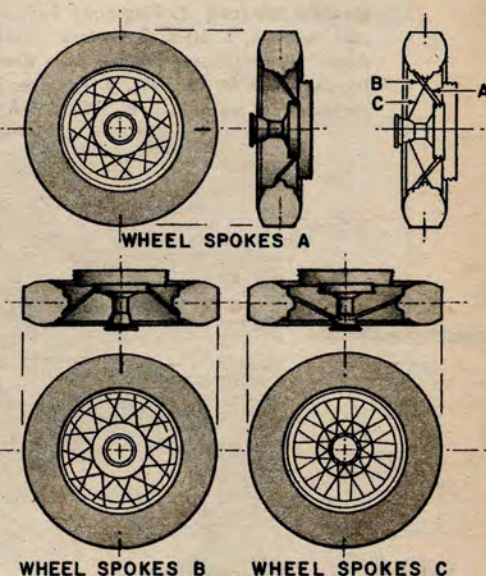
SECTIONS A,B,C

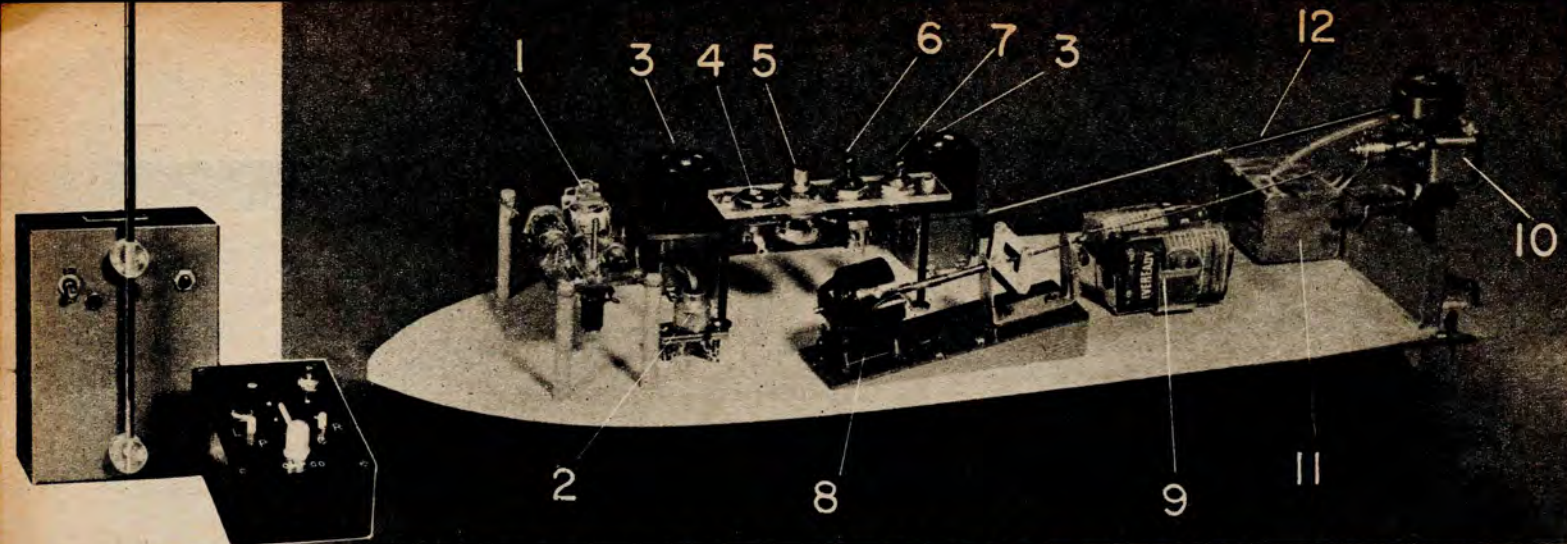


SECTIONS D,E



SECTIONS F,G,H,I,J





Outboard Powered Boat: 1. Deltron R100 receiver. 2. Receiver cable socket and plug. 3. Two Hillcrest holders for eight pencils. 4. Meter jack and plug. 5. Variable resistor for receiver. 6. Receiver on-off switch. 7. Actuator power switch. 8. Flyball actuator. 9. Two

22½ V. batteries (Eveready 420 or equiv.) in Acme No. 10 holder. 10. Atwood air-cooled outboard glow engine. 11. Additional fuel tank for longer engine runs, Perfect No. 12. 12. Spring to hold engine to right turn. Deltron transmitter with CMP proportional pulser

How to Radio Control Your Model Boat

**Tremendous selection in
powerplants, radio rigs
and accessories can some-
times get real confusing!**

■ Interest in R/C boats is growing. To help further progress, here are some equipment arrangements that are a bit different from the usual. We show three combinations, ranging from a small outboard-powered job up to a deluxe multi-control system suitable for the larger motor yacht kits. The first might be used in boats of about 20" length or so, and with this set-up you will get plenty of action, but the steering of this fast boat would be very smooth, since we have adapted model plane proportional control equipment to it.

Glow plug outboard motor arrangement: Starting at the bow, you'll note that the receiver is suspended on rubber bands; though we have dowels holding the bands, in the actual boat the rubber would be attached to bulkheads of the boat. There are two holders for four pencil batteries; in one of these, two pencils are connected in parallel for the filaments of the receiver tubes. The other two cells in this holder, and the four in the other holder are connected in series-parallel to give 4½ V. for the motor of the Flyball actuator.

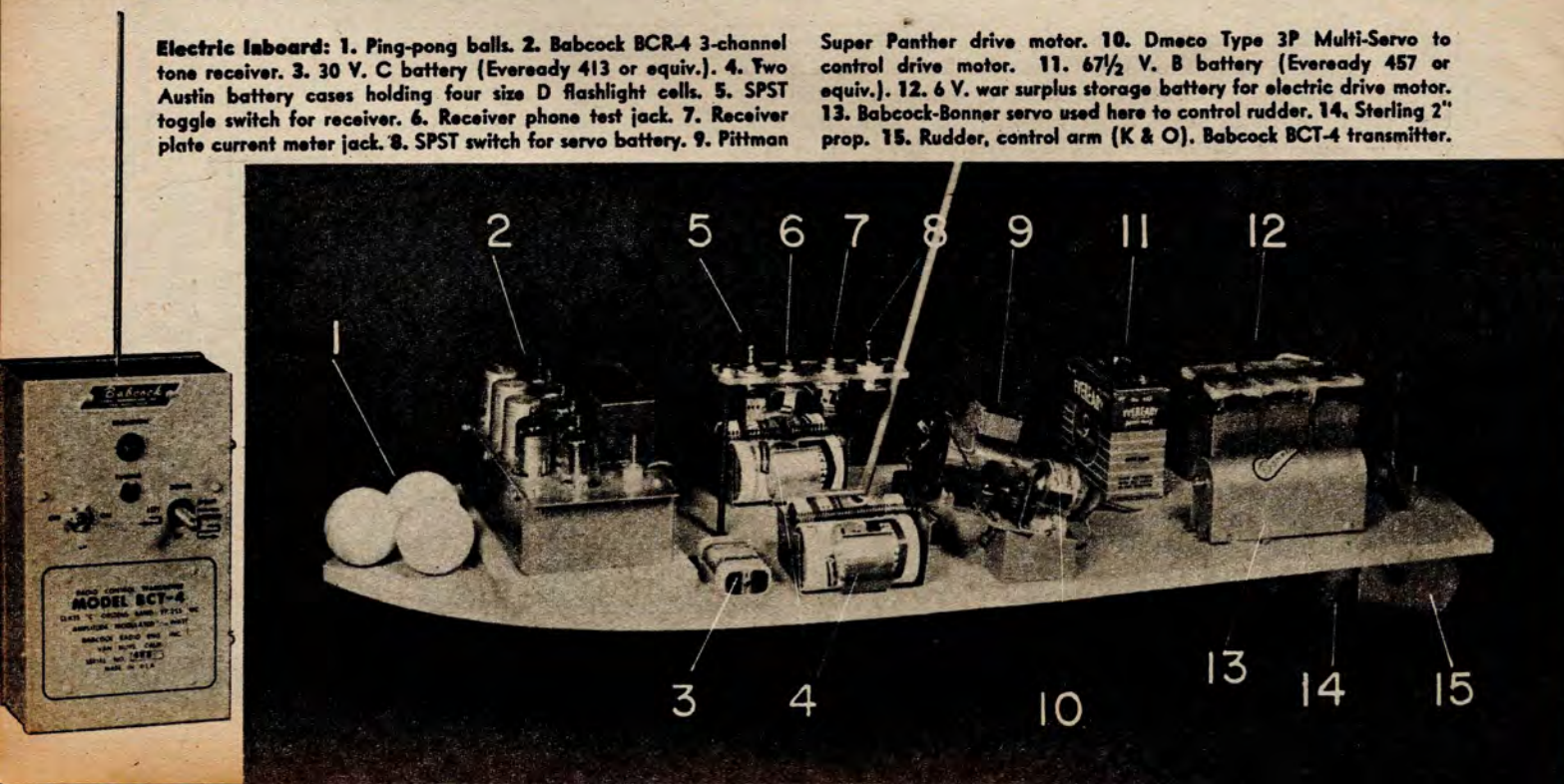
Controls will probably be mounted on

deck, and consist of a meter plug and socket, a pot for adjusting receiver current, a receiver on-off switch, and another toggle switch for the Flyball motor. Two moderate sized 22½ V. B batteries are mounted in a slightly rebent holder intended for size C flashlight cells; it would be smart to put a heavy rubber band over these cells, to make sure they aren't jounced out when the boat goes over waves, or shaken loose by engine vibration.

The outboard engine is attached to the transom in the usual manner, but the bracket must be reworked slightly, so that the motor will turn smoothly, but cannot wobble. A large fuel tank is used so that much longer runs may be made than would be possible with the tank that is built into the outboard unit. The control cable from the Flyball actuator is attached to one of the screws on the tank, while the screw on the other side goes to a spring which pulls the engine into a right-turn position when the Flyball actuator motor is not running. As the latter turns at faster and faster speed, the outboard is pulled smoothly around to the left-turn position, in which it appears in the illustration. When all the

Electric Inboard: 1. Ping-pong balls. 2. Babcock BCR-4 3-channel tone receiver. 3. 30 V. C battery (Eveready 413 or equiv.). 4. Two Austin battery cases holding four size D flashlight cells. 5. SPST toggle switch for receiver. 6. Receiver phone test jack. 7. Receiver plate current meter jack. 8. SPST switch for servo battery. 9. Pittman

Super Panther drive motor. 10. Dmeco Type 3P Multi-Servo to control drive motor. 11. 67½ V. B battery (Eveready 457 or equiv.). 12. 6 V. war surplus storage battery for electric drive motor. 13. Babcock-Bonner servo used here to control rudder. 14. Sterling 2" prop. 15. Rudder, control arm (K & O). Babcock BCT-4 transmitter.



equipment is set up ready for use, adjustment of this spring will enable the outboard to be set at neutral, when the actuator lever is centered.

As in most boat installations, the battery cases should be fastened in last; they may be moved around to distribute weight, so that the boat sits properly on the water. And one more most important point—if at all possible, such vulnerable components as the receiver, actuator and even the batteries should be protected from spray, and should be made waterproof if you can manage it. You can work this by installing watertight compartments below deck; if some elements of the installation must be out in the open, they may be protected by mounting them in plastic boxes or by simply wrapping them up in the small plastic bags that supermarket vegetables are packed in.

Since this installation is of the proportional type, a pulser must be used at the transmitter; any of those on the market may be connected to the normal

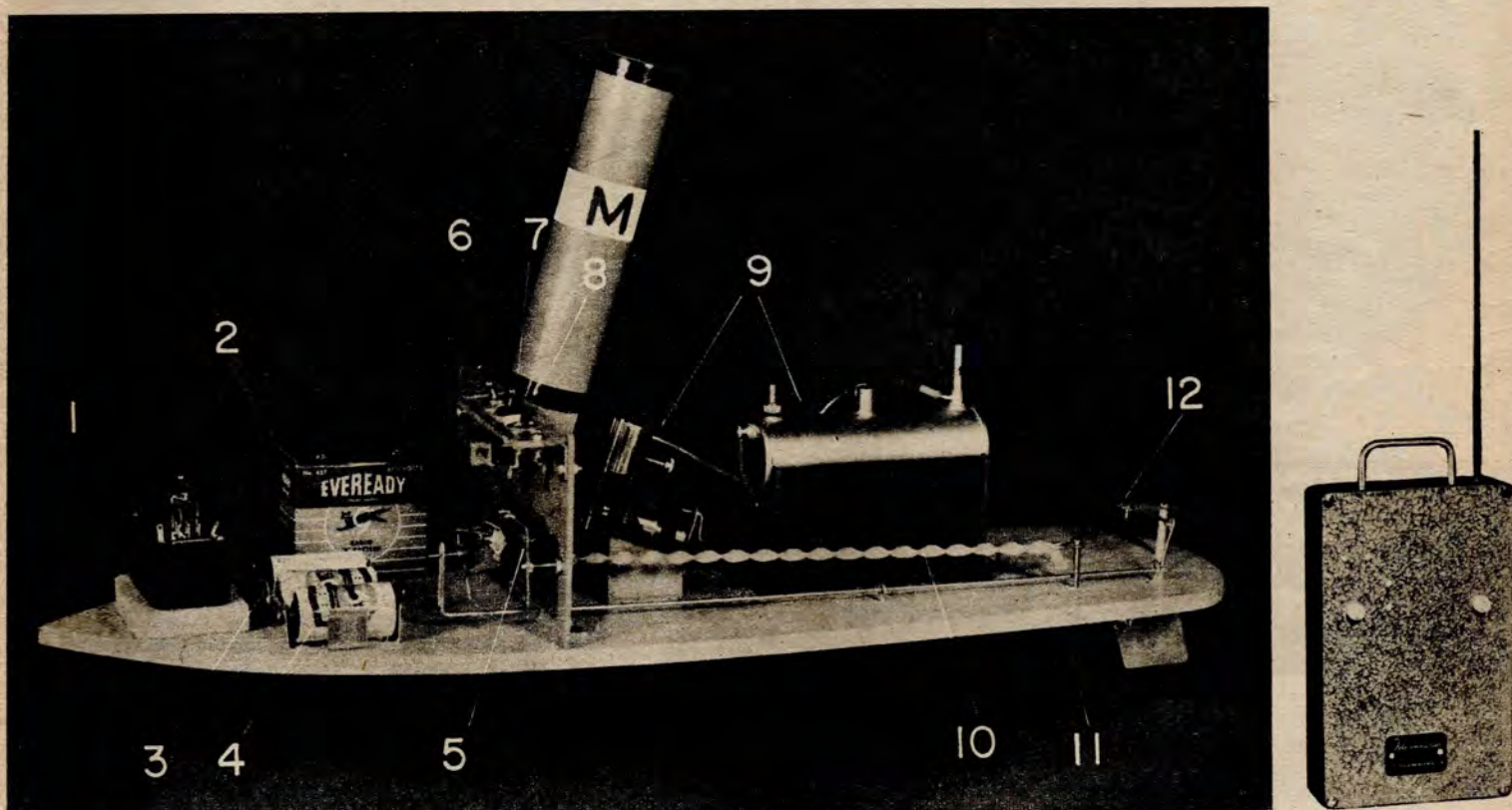
tion can be made watertight as well, so that even if the boat founders, no damage will be done.

We show the escapement attached to the bulkhead, with the driving rubber running aft in the boat. This was done only to get a good length of rubber, so that you won't have to wind it so often. Both the hole through which the rubber passes and that for the control rod should be sealed with rubber gaskets. A simple linkage operates the rudder, at the stern of the boat, and you will probably have to use as much rubber as the escapement will handle. The extra set of electrical contacts on the escapement are not used in the installation shown; they might be connected to a horn (don't try to use the whistle on the boiler for this—you will use up too much steam!) that would then sound every time you sent three pulses on the radio.

With the heavy rubber utilized, the escapement needs $4\frac{1}{2}$ V. for reliable operation. The voltage is provided by three

directions for installing and running the power plant are furnished with it, so we won't go into this here. There is one point that we should mention, though; in most cases the engine will require a twist of the flywheel to start it; since you will doubtless have the deck off the engine room, while firing up, this is no hardship. A fair amount of heat is given off by the power plant, and you should provide a working funnel—or at least, plenty of vents—for this compartment. Also, the engine room should be fireproofed. Several coats of waterglass will take care of this detail.

Here's one last suggestion; the exhaust steam from the engine comes out of a port in the engine frame, and would thus blow into the hull. We strongly advise that a pipe be attached to this port and directed up the funnel—it will keep the moisture out of the boat, and at the same time, the steam coming out of the funnel will afford a draft to carry heat out of the hull, and will look realistic, too.



Steamboat: 1. ECC Telecommander 951B receiver on sponge rubber pad. 2. $6\frac{1}{2}$ V. B battery (Eveready 457 or equiv.). 3. Single size C flashlight cell in Acme #9 holder. 4. Two C cells in Acme #10 holder. 5. Cameron Compound escapement. 6. SPST toggle

switch for receiver. 7. SPST toggle switch for escapement. 8. Meter plug and jack. 9. Allyson steam engine and boiler. 10. Rubber band power for escapement. 11. Allyson propeller, shaft and stuffing box. 12. Rudder linkage. ECC Telecommander #1061 MOPA transmitter.

pushbutton "key" found in the transmitter you use. For ease of operation, it is suggested that the pulser be fastened right to the transmitter case so that the two may be handled as a unit.

Steam-powered set-up: Our next installation shows something a little different—a steam-powered vessel. This could be fitted into a hull of the tugboat type, which should be quite deep if it follows the true tug lines. It will be noted here that all of the R/C components are fitted ahead of a bulkhead that isolates them from the engine room; this is of the utmost importance. The heat and inevitable moisture from the steam plant will quickly put the radio equipment out of business, if you don't isolate the two sections. While you are at it, the radio sec-

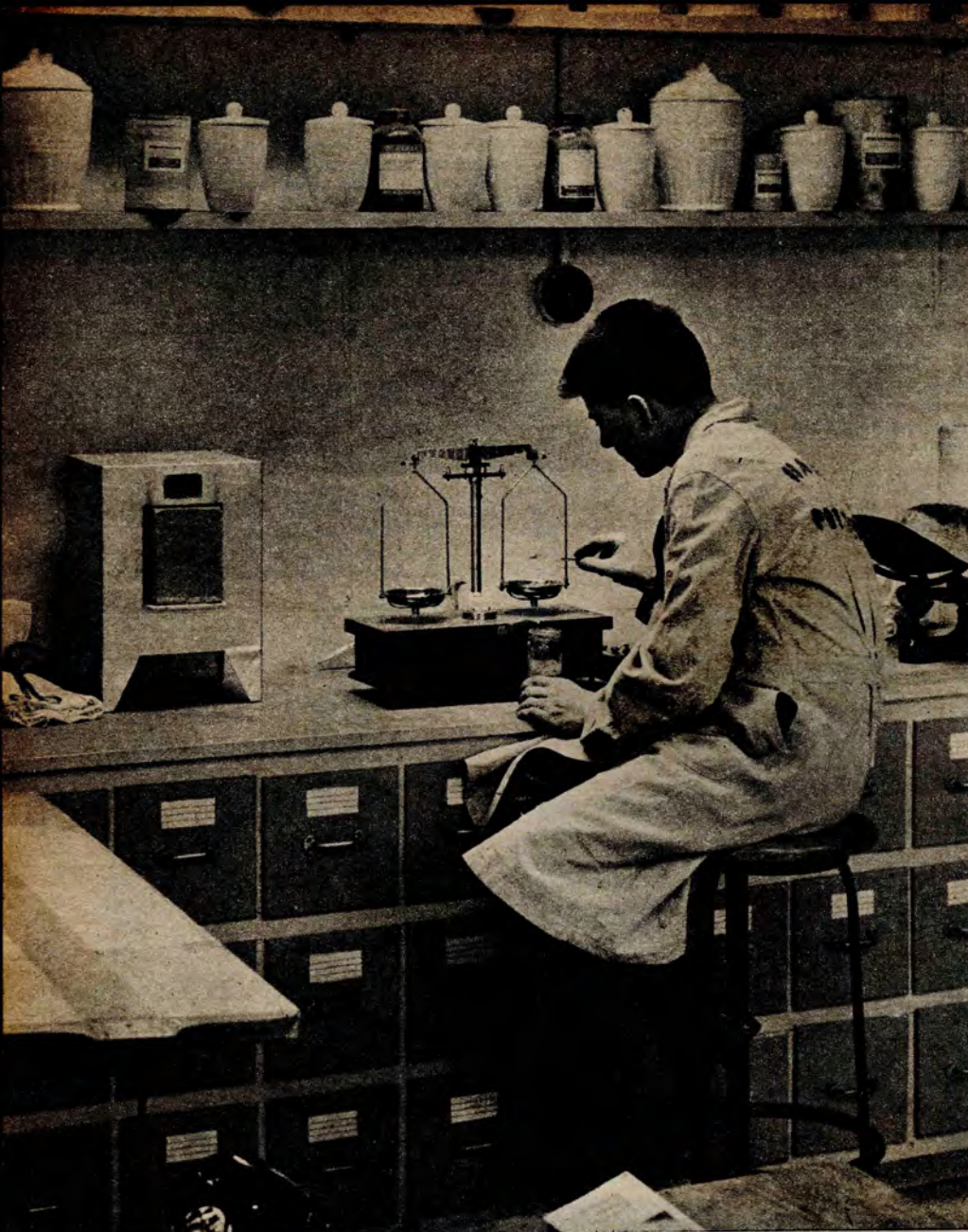
C size flashlight cells, and one of these cells is also wired up to the filament circuit of the receiver. This gives an unequal drain on the three cells, of course, but you can even things up by shifting the cells in their holders from time to time.

The single hard tube receiver requires 60-90 V., so we provide a standard $6\frac{1}{2}$ V. battery. As mentioned previously, don't fasten down any of the batteries till you see where they should be placed for best weight distribution.

The complete steam plant along with the propeller and stuffing box is available on the market. The boiler is fired by a small alcohol lamp, and liquid capacities are such that the lamp will always run out of fuel before the boiler water is used up—a valuable safety feature. Full

Electric power deluxe: Our last installation is a deluxe job affording full range of steering in any desired degree, and also forward-stop-reverse drive motor control. It is based on the Babcock 3-channel radio equipment, the receiver being mounted near the nose of the ship on a piece of sponge rubber. Those are not eggs right in front of the receiver—they are ping-pong balls. Such balls can be stuffed into any closed compartments in the boat, and are an invaluable safety factor to keep your ship out of Davy Jones' locker, in case of a collision or other maritime catastrophe.

Propulsion of this boat is by the Pittman Super Panther electric motor, a unit perfect for our purposes, since the switch that is fitted to it can be linked to a Dmeco type 3P (Continued on page 90)



"Ceramic Industry" Magazine

Today ceramic research is active in all branches, whether in clay or glass, pottery or cement. Besides offering employment, research expands uses for ceramics, upping need for engineers.

Many Jobs in Many Fields Await the *Ceramic Engineer*

Here in second half of this career survey for high school students we list the colleges, describe the courses, kinds of positions open—the whole works!



"Ceramic Industry" Magazine

Grinding stones like these are also ceramic products—representing abrasive industry.

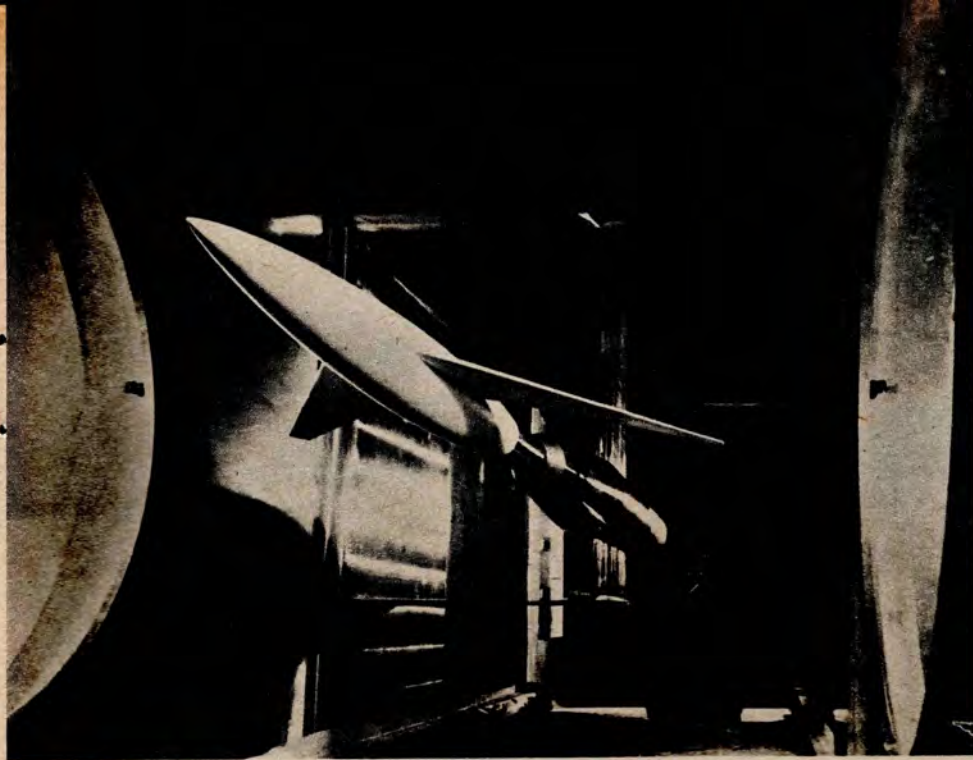
■ Even a lot of the experts don't realize that today "ceramics" includes products manufactured by seven main industries. There are structural claywares like brick and building tile, refractories and heat-resisting materials, pottery such as china or electrical insulators, glass products of all kinds (don't forget glass cloth and glass fiber for insulation), porcelain enamelware (as on washing machines and bathtubs), abrasives like grinding wheels, and the "heavy products" that come under the heading of lime, plaster and cement.

An equal number of experts don't know that today's \$5 billion ceramics industry as a whole is desperate and begging for engineers trained in its field. Less than 200 graduates are being turned out to fill the need; in the next four years the number of graduates will amount to a bare 25% of those required. Each day practically some new use of a ceramic product is found or considered, whether as a liner in jet engines or for vital service in tomorrow's nuclear powerplant.

All these facts added together spell rare opportunity for those interested in science and engineering. In many cases the pay is better than that for other kinds of beginning engineers, because of the dearth of applicants. That dearth is due mainly to plain lack of knowledge, concerning both the field and the excellent chances ahead. Our purpose here is to inform you about the whole subject; then you can decide if you are interested.

Just what does the ceramic engineer do? What kind of positions can he hold, what are his duties? And where does he find work? First, let's clear up some designations. As previously explained, the broad term is actually "ceramist," which includes the engineer, the technologist and the designer. (Ceramic designing is properly in the field of art, and not our concern here, though brief information will be given later for those interested.) An important branch of technology in ceramics is glass technology—so important that this specialization rates a course of its own in training.

The ceramic engineer or technologist is employed in four main kinds of positions—administration, production, sales



Corning Glass Works

Glass is now an important engineering material. Giant optical glass disks, weighing nearly ton, here permit viewing of jet model action in wind tunnel. (Jet engines also use ceramics.)

and research. By far the largest number get jobs in production, which involves the actual making of the product. The duties in the manufacturing end include attention to the cost factor, specifying the scientifically correct firing time and temperature for the purpose at hand, maintaining quality, increasing efficiency and the like. In sales, the engineer uses his technical background to help the customer as only one trained in ceramics can, explaining characteristics of the product, finding the right one for the customer's needs and so on.

While it is true that administrative positions are usually given to those with considerable experience in a particular ceramic company or ceramic industry, it is also true that nowadays expansion and other factors encourage the use of

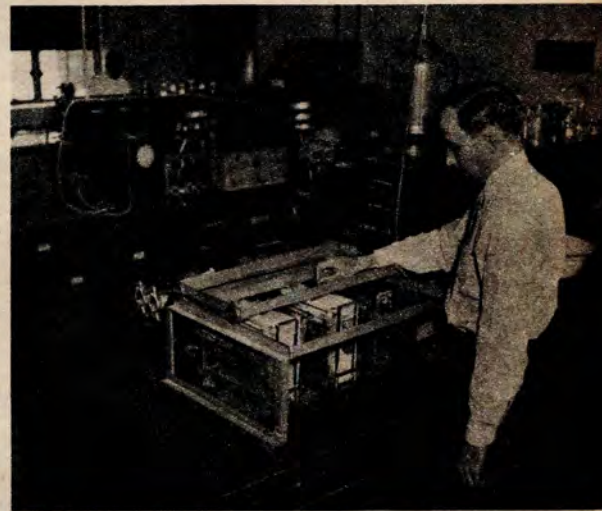
younger men in executive jobs—men with college training in ceramics.

One of the most vital areas of employment is in research. Ceramic industries themselves conduct research programs. This year Corning Glass Works is doubling the amount of space devoted to its long-established research center at Corning, N. Y.; the Hudson River Brick Manufacturers maintain a laboratory in Kingston for research in the making of soft-mud brick. Government agencies like the Air Research and Development Command, Atomic Energy Commission, and Army Ordnance Department are exploring the secrets of ceramics in connection with colleges and universities teaching this subject. A great deal of such research is of the fundamental kind, (Continued on page 65)



Lever Brothers Co.

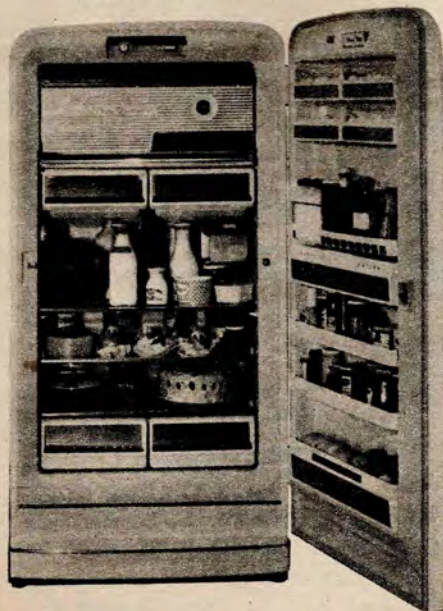
Structural glass and big double glass panes form entire exterior of this office building.



Pa. Ceramics Association

In this ceramics lab, clay is being purified by electrodialysis. Science plays vital role.

Westinghouse Electric Corp.



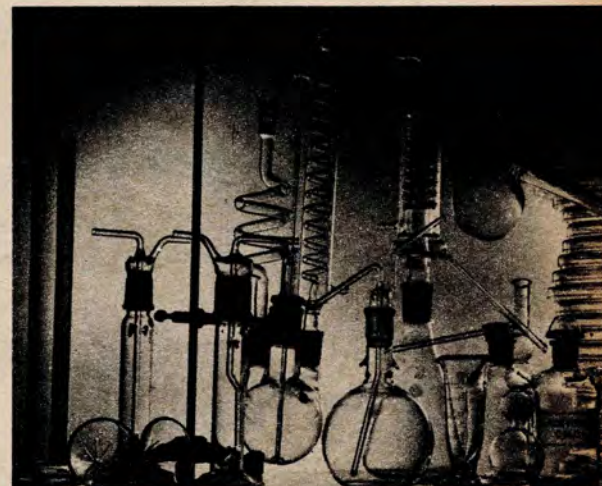
Wide ceramic demand evident in home: TV tube, porcelain enamel on refrigerator, etc.

Westinghouse Electric Corp.



Laboratory ware is standard glass product. Must resist heat, be chemically stable.

Corning Glass Works





Realistic North American P-51 Mustang (left) with four-bladed prop.

P-39 Aircobra model of famous Bell fighter needs 3-blade prop.



Making Multi-Blade Model Plane Propellers

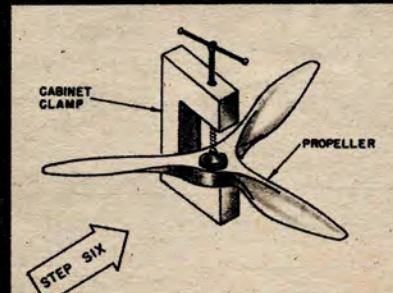
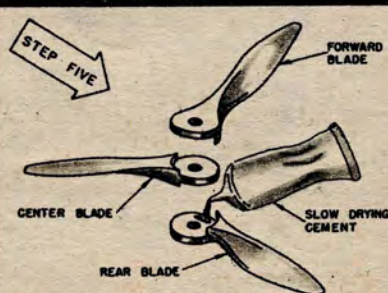
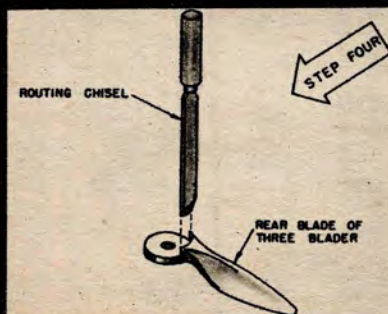
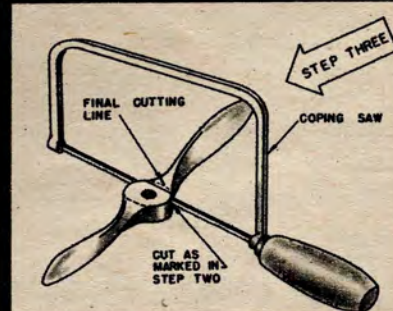
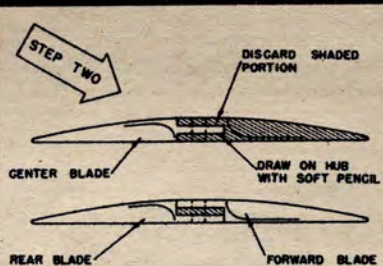
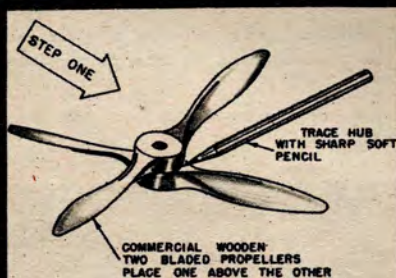
Since you can't buy 'em you've got to make them yourself—here's safe way

■ The widespread popularity of flying scale model airplanes in both the free flight and control-line categories has increased the required use of three- and four-bladed propellers in order to maintain true scale appearance. There is no doubt that a replica of a Mustang, Spitfire or Wildcat loses much of its appeal when fitted with a standard two-blader. True, there is a slight loss of efficiency due to cavitation caused by the high rpm of today's direct-drive engines. However, unless exceptionally high speeds or super stunting are intended, this loss of efficiency is not detrimental to the performance of the model.

Selecting the pitch and diameter of your multi-bladed propeller is of course a very flexible affair, depending much upon the engine and model design. As a general rule, however, it is safe to select a diameter for the three- or four-blader which is about 15 percent less than the standard two-bladed propeller you would normally select for the engine-plane combination. We have found that narrow blades with a relatively low pitch have performed very successfully. A four-inch pitch seems to operate the best for engines of average power: 0.9 to .23 cubic inch displacement.

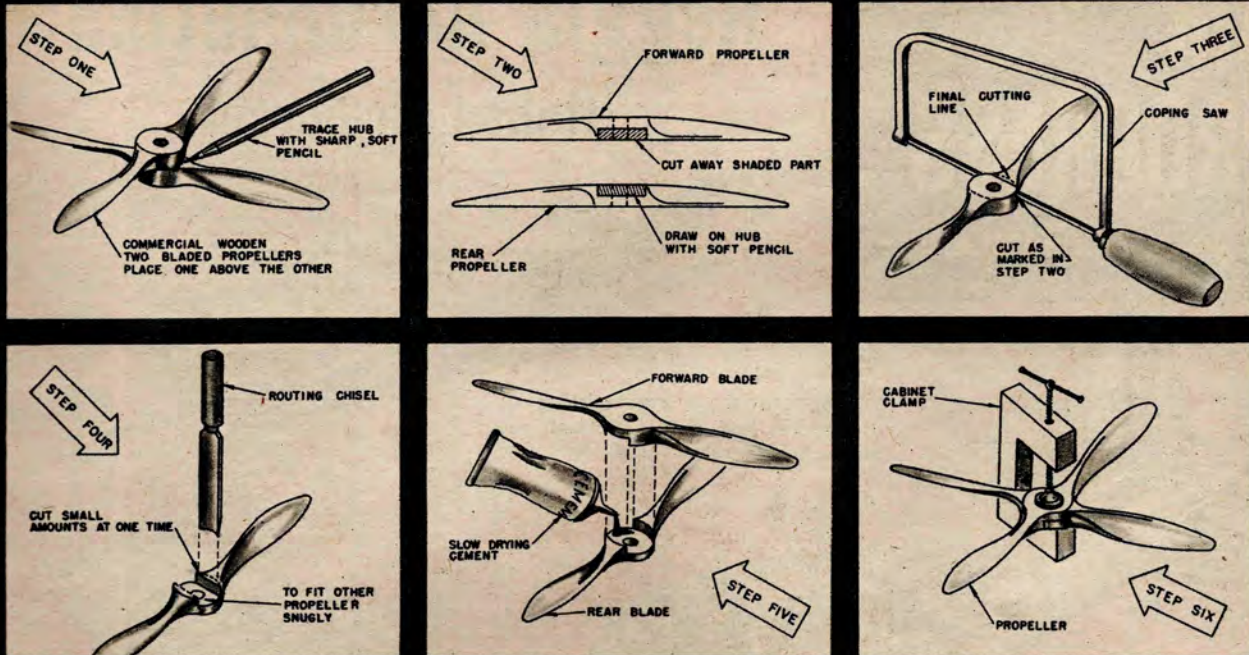
Numerous construction methods exist which produce good multi-blade propellers from commercial two-bladers. Perhaps we should have said "good and safe multi-blade propellers," for safety is a far more important factor than anything else. Some construction methods include the use of thin plywood gussets on both sides of the hub which hold the propeller blades together. This assembly is held together with very small brads and cement. We do not recommend it. Another method for three-bladers is to drill diagonal holes in line through two blades at a time and drive dowels with cement through them.

Neither method can be compared to the neat, strong and



THREE-BLADED PROPELLER

FOUR-BLADED PROPELLER



safe multi-bladed propellers produced by lapped joints. With lapped joints, the engine propeller shaft passes through every blade and actually helps to hold the propeller together.

Two standard commercial two-blade propellers are required in order to construct a three- or four-bladed propeller. Construction steps are virtually identical for both types. Place one propeller atop the other, at right angles, and trace the outline of the hub with a sharp, soft pencil as illustrated in Step One. Reverse the position of the propellers and trace the hub outline onto the other propeller.

Study Step Two and mark off the cutting lines on the sides of the two propellers. The shaded portions are to be discarded, and therefore care need not be taken to keep from cutting into these areas. Be extra careful, however, not to cut away or split the usable portions. With these lines correctly marked, the blades can be now cut apart.

Using a coping saw or vibrating jig saw, cut slowly into the propeller hub as shown in Step Three. Be sure to cut only as deep as previously marked in Step Two. Note that these cuts do not extend out to the edge of the circle on the hub, drawn in Step One, but rather to the point where the drawn circle becomes tangent with the curve of the hub. With this accomplished, carefully cut horizontally to separate the blades.

Once the blades are separated, they can be trimmed to a good fit. One of the fitting requirements is that the hub curves fit well. With a routing chisel or X-acto tool, cut the hub curve as illustrated in Step Four. The tool should be very sharp, and only a small amount should be cut away at one time.

When the blades fit snugly with the engine shaft holes in

perfect alignment, smear a coat of cement on the surfaces of the hubs and let dry. Apply more cement and press the blades together as shown in Step Five. Be certain that the blades on the three-bladers are 120 degrees apart; those on the four-blader should be at right angles or 90 degrees apart.

The blades should be held together overnight with a set of small "C" or cabinet clamps to insure a firm joint.

Next, sand the multi-blader thoroughly with 3/0 paper. A coat of wood sealer can now be applied if desired. Sand and follow with a fuel-proof finish for the color.

With multi-bladed as with any propeller, don't get your face over it when it's in operation.—WALTER A. MUSCIANO



For real scale appearance the F-82 is fitted with two 4-bladers.

Another 3-blade scaler: sleek Vickers Supermarine Spitfire Mk II.

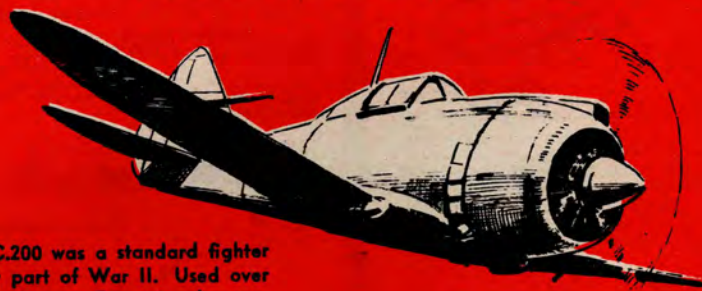
German World War II fighter, the Me 109E, takes 3-blade propeller.



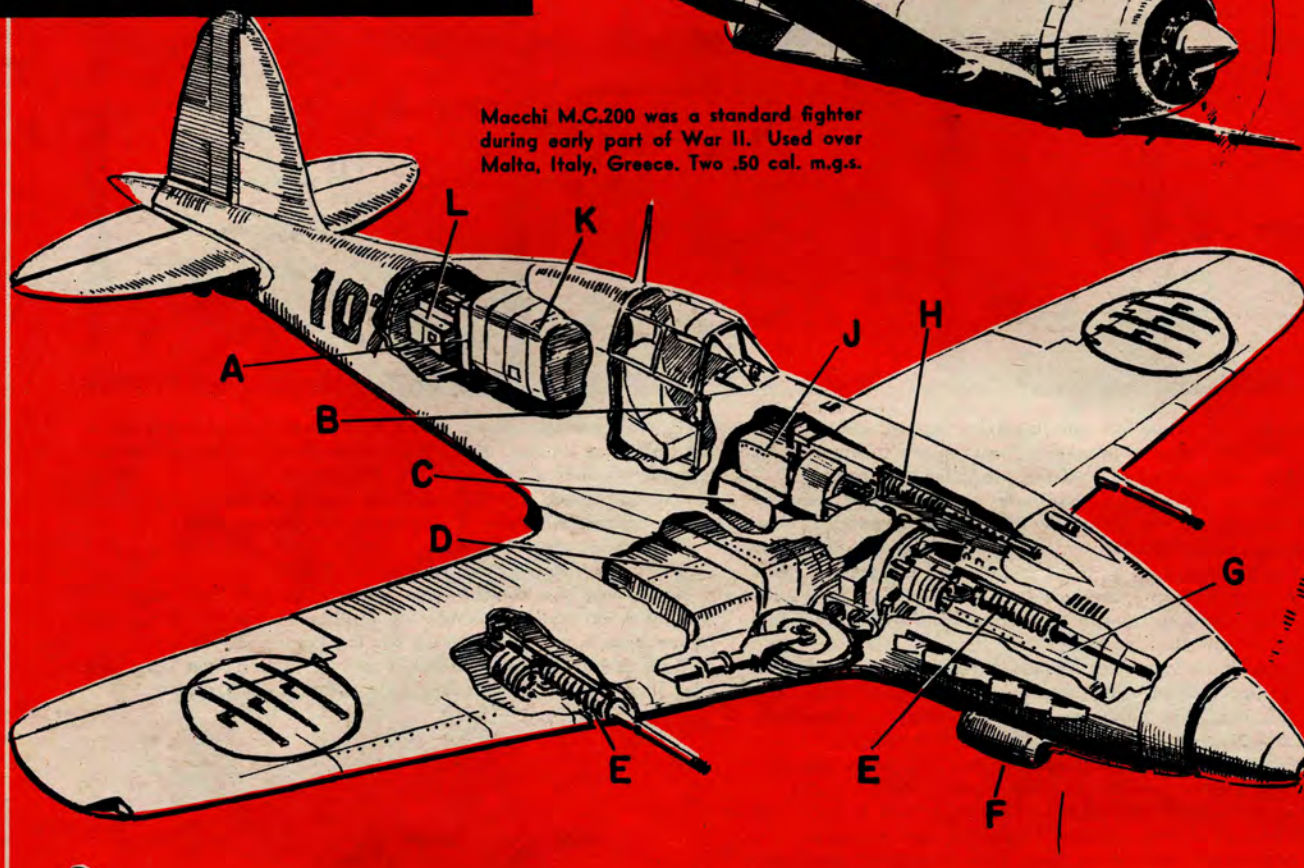
AIR PROGRESS

By ROLFE and BARILANI

Reggia Aeronautica (Italian Air Force)



Macchi M.C.200 was a standard fighter during early part of War II. Used over Malta, Italy, Greece. Two .50 cal. m.g.s.



Macchi M.C.205 (above). First appeared in 1943. Was a development of the M.C.202, in-line engine version of the radial "200". A. Oxygen bottles. B. Gun triggers and throttle. C. Oil tank. D. 76 gal. fuel tank. E. 20-mm cannon. F. Oil radiator. G. 1475 hp Daimler-Benz 605 engine. H. 12.7-mm (.50 cal.) machine guns. J. Engine coolant tank. K. Fuel tank. L. Marelli type radio compass.



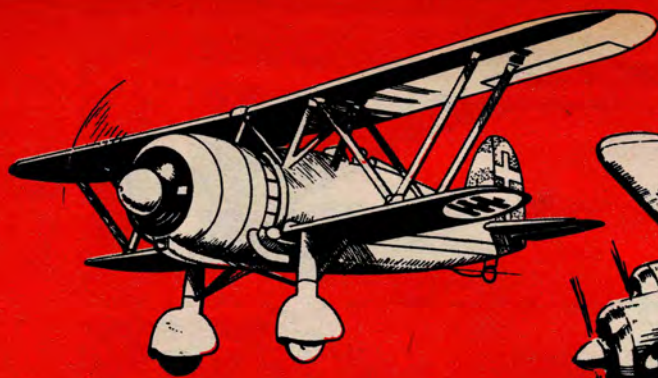
Fiat R.S.14, standard naval reconnaissance and torpedo bomber at the outbreak of War II. It was powered by two Fiat radial engines of 840 hp each, carried a crew of four. Span was 64 ft. 3 in., top speed 235 mph.



Breda 88 fighter-bomber was the fastest and most formidable plane of this class, at outbreak of war. Armed with two cannon and three machine guns, was capable of 330 mph.

In the uneasy years and months which preceded the outbreak of World War II, the Italian Air Force was widely considered a formidable weapon. Reorganized by Mussolini, it proved an effective and modern air arm during the Ethiopian and Spanish campaigns, causing even Britain to back down

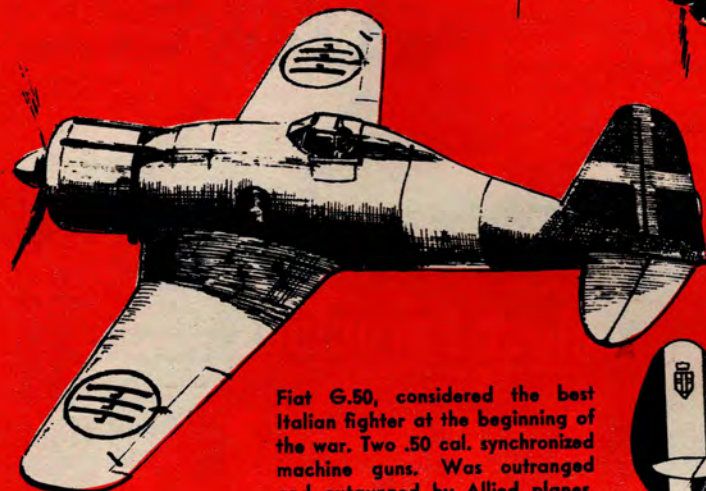
before the ominous threat of Italy's bombers and fighters. When Italy entered the war, in June 1940, the Reggia Aeronautica had approximately 2500 first-line aircraft with which it hoped to control the Mediterranean. This hope, however, failed to materialize as many weaknesses rapidly developed



Fiat C.R.42. Used during Ethiopian war, 1938-41, and early part of War II. 840 hp Fiat engine, two .30 cal. machine guns.



Savoia-Marchetti S.M.79 "Spaviera," Italy's standard long-range bomber. Served in Spanish war as well as in Africa against the Allies. Also torpedo bomber.

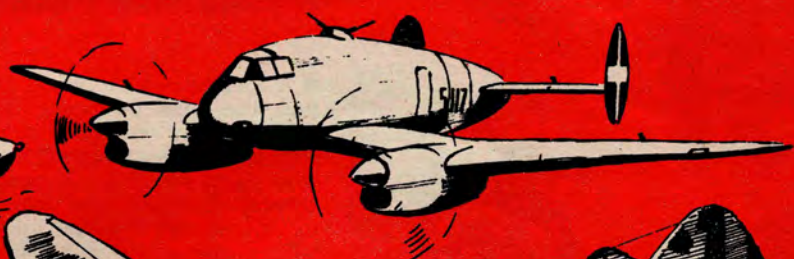


Fiat G.50, considered the best Italian fighter at the beginning of the war. Two .50 cal. synchronized machine guns. Was outranged and outgunned by Allied planes.

Jonas J.6/S trainer (below). Top wing was tilted sideways. Plane could be flown with stick control only. 240 hp Alfa-Romeo engine.



Meridionale Ro 43. Single-place reconnaissance seaplane fighter, catapult-launched from cruisers and battleships. Two .30 cal. machine guns.



Caproni CA 331 (above, right), night fighter and light bomber, appeared towards end of war. Two Isotta-Fraschini 825 hp engines, eight machine guns.



Reggiane RE 2001 (right) had as ancestor the export version of Seversky P-35 fighter. Powered by a Daimler Benz D.B.601 engine of 1100 hp, it boasted top speed of 345 mph. Two .50 cal. m.g.s., two .30's.

throughout the air force, not the least of which were poor maintenance, low personnel morale and stalled production. Shown here are some of Italy's military airplanes. Our feature will continue in next month's issue with such interesting airplanes as Bruno Mussolini's 4-engine bomber and others.



Most Ferocious Hobby

Minks



Not all minks are brown. This white chap is known as "Snowwhite" variety. Other breeds are Silverblu, Breath of Spring, Blue Frost.

■ A member of the royal family of furs, the mink for years has graced the shoulders of social leaders, successful actresses and affluent ladies who could afford a tab running into several thousand and more dollars for a coat. This weasel-like animal with a disposition many times nastier than its size was originally hunted out of its lair by trappers. Lately, however, a lucrative hobby of raising them in captivity on mink farms has been flourishing all over the country. But loving care did not mellow the mink's unpleasant attitude. Probably no other animal has its ferocious disposition. Unless watched carefully, the mothers will eat their young, especially in captivity. Heavy rawhide gloves must

be worn while handling minks if one wants to keep his fingers. To get started, all needed is an initial outlay of a few hundred dollars for a male and several females. Then time and energy to build pens, buy feed, skin the animals. But it usually takes approximately ten years for a mink farm to begin paying off! Exception to the rule is a New Jersey mink farmer, C. Crampton Belton, Jr. a telephone line worker by trade, who put his farm on paying basis within five years. He has over 200 animals now, and eventually will be able to produce 1000 a year, which at current prices of \$25 per pelt will assure him of a handsome income. Good minks lead a short life, being killed for their pelts at six months.

Mink diet consists of vitamin oil (on the left) beneficial to the coat, salt water fish, grain and fruit. Fresh-water fish make mink sick.





Protective glove used for handling the ferocious critter is of stout rawhide reinforced with double tip which teeth can't penetrate.



When minks are born they are no longer than a cigarette in size, but grow rapidly, gaining about two pounds in weight within two months.



Left: Mink farmer Belton transferring a mink to breeding cage. Hole in box is matched with hole in cage permitting animal to cross



through. Center: To protect minks from elements, tar paper is placed over cage at night. Right: Health check—if vivacious, he is healthy.



Double layer on glove serves twofold purpose. Besides protecting it offers a flap to which mink can cling with his teeth during handling.

Belton's pride is this caged specimen of Breath of Spring, the most expensive variety. A coat of such fur brings as much as \$6000.



Recognize this plane? It's the land version of a famous rescue craft for control line flying with engines from .14 to .29 cu. in.

■ Back in 1939 the Chance Vought Aircraft Company unveiled its OS2U-1 "Kingfisher." It was built in two versions with wheels and floats and saw extensive service in the Pacific area during World War II. The Kingfisher was designed especially for rescue and observation work, and gained wide fame when one on floats rescued Captain Eddie Rickenbacker who was adrift and close to death in the Pacific Ocean.

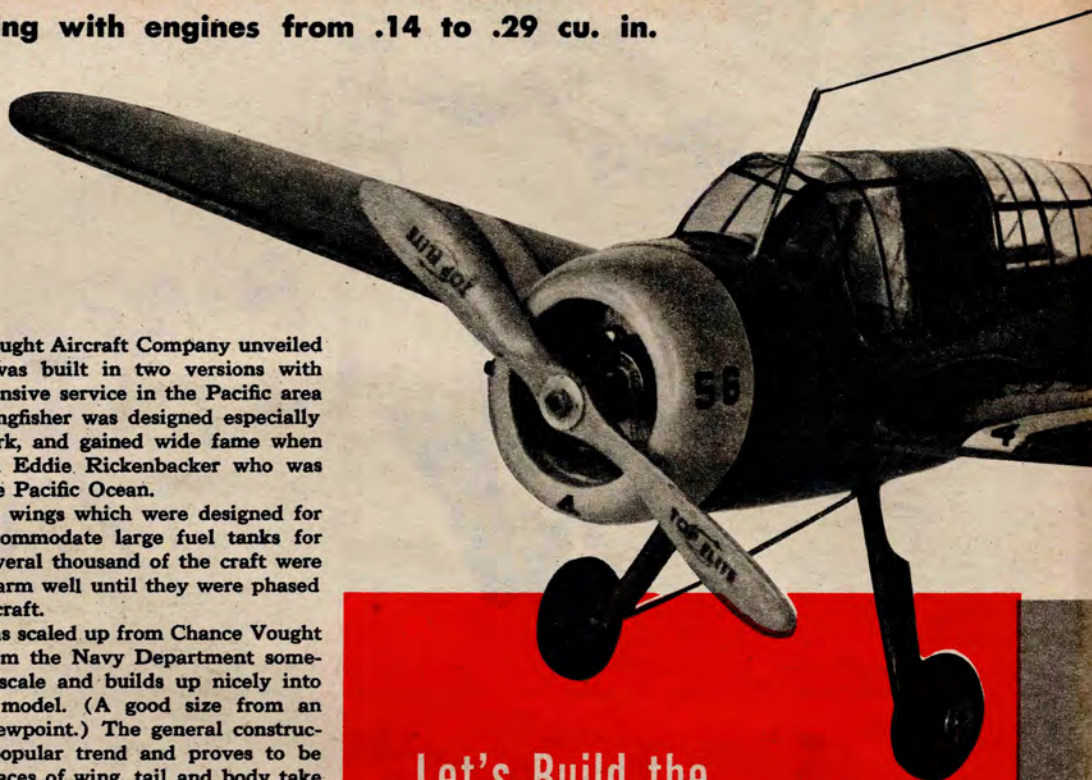
Readers will note the ample wings which were designed for light wing loading and to accommodate large fuel tanks for long hours of patrol flying. Several thousand of the craft were built and served our Navy air arm well until they were phased out in favor of more modern craft.

The model presented here was scaled up from Chance Vought plans which were available from the Navy Department some time ago. It is quite close to scale and builds up nicely into about a two-foot wingspread model. (A good size from an economy and transportation viewpoint.) The general construction of the model follows a popular trend and proves to be fast and strong. The balsa surfaces of wing, tail and body take a fine finish and enable a nifty paint job if a little care is taken.

Let's begin by building the body. Cut the main body outline from $\frac{1}{4}$ " sheet, then the body formers, as shown full size on the plan, from $\frac{1}{8}$ " sheet. Cement these formers on the body outline where indicated. Note that former #1 requires the making of two. One is a full circle, which is added after planking the body. The other is made in two pieces as shown. Former #2, as all other plywood pieces, is cut from $\frac{1}{8}$ " plywood. The plywood sheet can be cut quite easily with a small coping saw available at any small hand-tool store.

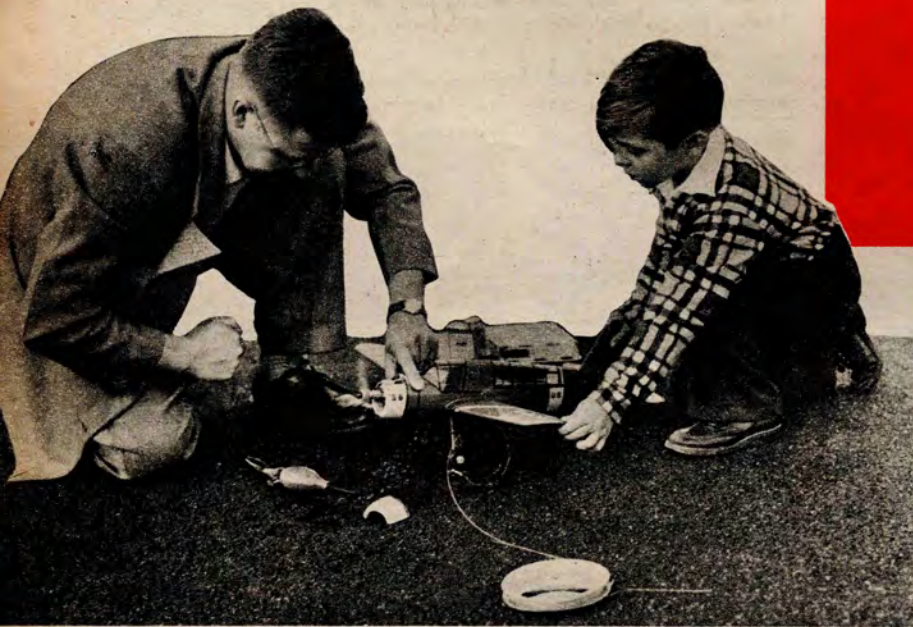
At this time you can cut out the tail pieces which are all made from $\frac{3}{16}$ " sheet balsa. Perhaps you will laminate pieces of $\frac{1}{8}$ " and $\frac{1}{16}$ ", that will provide the necessary thickness. The rudder is cut on the hinge line and then glued back together with a $\frac{1}{2}$ " offset to the right, which will cause the model to fly to the outside of the circle. Sand to a streamline shape and set aside.

The stabilizer and elevators are cut to outline shape and joined with a $\frac{3}{16}$ " dowel with your favorite hinges. Cloth



Let's Build the
Chance Vought
OS2U-1
"Kingfisher"

By **ALBERT E. CHRISTEN**



Plenty of interest in this World War II design! When you bring your Kingfisher out to the circle for the first time, watch the fans gather 'round.

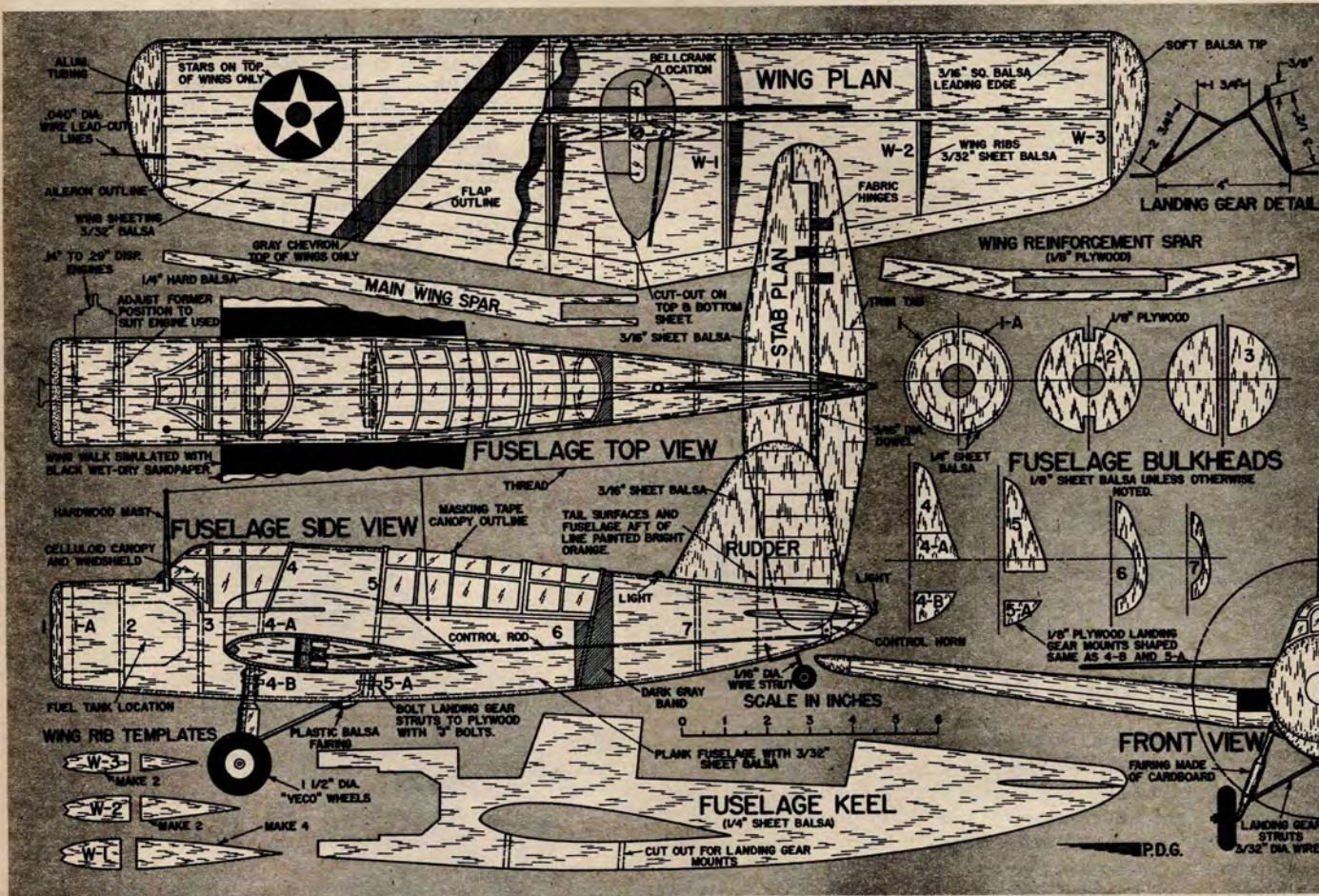
With span of 2' and overall length of 19" your OS2U-1 is small enough to transport, big enough to perform well. Who could ask for more!

strips may be used. Put at least three strips on each side and allow for a loose elevator action. Attach commercial bellcrank in position shown. Glue horizontal tail in slot on main body former and partially plank body to make it rigid for easier handling, the body is to be planked with 3/32"x1/4" balsa strips. Where necessary taper and bevel strips to get snug fit. Glue well to formers and each other, holding with pins until dry.

At this time the wing can be made. Begin by cutting out one plywood spar and two balsa spars as noted on plan. Glue these pieces well together and hold with small clamps until dry. Top and bottom of wing are covered with 3/32" sheet. Make center section first, which is flat, having no dihedral. Cut out the sheet skin for the top and bottom. Glue spar unit on the top of bottom sheet and add ribs (A). At this time add the plywood bellcrank mounts at top and bottom of spar and glue well. The exact position is shown on the plans.

Mount bellcrank and lead-out wires. Bellcrank must have free action and clearance and lead-outs should be twisted and soldered. Top skin of center section can now be cemented on. Bevel bottom sheet at front and trailing edge to insure proper airfoil shape. The writer found small paper clamps ideal for clamping the sheet skin until dry.

Second set of (A) ribs are glued on next, and then bottom outboard wing panels. Same procedure should be followed now



Full-size plans for Vought Kingfisher are part of Group Plan #555 from Hobby Helpers, 770 Hunts Point Ave., New York 59, N.Y. (50¢)



as for center section. Cut slots in lower left wing for lead-out wires, and finish wing. Wing tips are cut to outline shape and cemented in place. Now they can be carved and sanded to proper shape. Sand entire wing assembly and securely glue in proper place on partially completed body.

Next add the 1/16" elevator control wire to bellcrank and elevator horn. Solder a washer at each end to keep secure. Check unit for smooth action and correct where necessary.

Make landing gear from 1/16" wire. Correct dimensions are on plan. Wrap with soft copper wire and solder. Cut plywood landing gear support and glue well to gear, then install unit on fuselage, using enough cement for a strong assembly.

(Continued on page 76)

HOBBY MODEL WORLD®

THE DOPE CAN

Prize Practices. A most interesting discussion took place at the annual trade show and convention of the Model Industry Association in Grand Rapids, Michigan, a few weeks ago. This exhibition of manufacturers' products in the modelcraft and handicraft fields drew most of the top industry figures. One of the topics of conversation concerned prizes for model contests.

Although Academy of Model Aeronautics representatives in attendance claimed there were more sanctioned air-model contests in 1954 than ever before, most manufacturing concerns indicated that requests for prizes from meet directors were fewer in '54 than in previous years. We never did get a clear picture of whether modelplane meets were on the downgrade or upswing.

Although organized model aviation competitions may be dropping off, it was pretty certain that model boating interest is growing rapidly. And model race cars seem to be climbing back after hitting a low spot during the past several years. Two bright spots, anyway.

CALIFORNIA AIR CARS

■ Out on the West Coast where the sport of racing air-prop cars has been revived it's a case of almost anything going that goes! Take these varying vehicles, for instance (from top down): Mark Tackett's winning Half-A air car consists of a short length of a large diameter aluminum tube with spinners at each end. Wheels are K&B; powered with an .065 Spitfire, this job turned in 51 mph plus. Next is Dick Everett's experimental test bed to try out tank and wheels. Uses pressure tank, Perfect wheels. Then you come face to face with Bob Anke's streamlined entry. So far he's been having plug trouble which has held down his speed. Reports Everett: "Designs are not static!" Natural advantage of air prop cars is that they can be raced most anywhere (parking lots, garages, indoors, outdoors) and require very little in the way of track equipment.

Here's an enterprising young air car fan (right) who found all the necessary ingredients in his Erector set for turning out a "basic" racer. We bet Erector set pieces never went so fast!



Here's a section for those interested in model planes, cars and boats. Send along news of your club. We pay \$10 apiece for photos used here—plus special awards!

But besides the progress reports the discussion that really made us sit up and pay attention centered about contest prize solicitations by some organized groups and especially in one particular area. Seems that it goes like this. The So-and-so M.A.C. writes manufacturers that it is putting on a contest on a certain date—how about some merchandise for awards? Some concerns come through with prize donations. The meet is held and the awards are passed out. Only unusual thing is that no one but club members "compete" in this "meet"—in fact, nobody else knows about the alleged competition. The recorded flights are but token ones in case anybody should ever check; actually it's a divvying up of the loot—according to the folks who decry the system.

A variation on this theme is when the members of the So-and-so M.A.C. are polled to find out how many XYZ .29's they want for the next flying season. Let's say a total of 11 are desired. Well, here's what happens in this case. The "meet" director writes the XYZ Motor Co. and says the club is putting on a big meet on such and such a day at such and such a place. Major prizes are to be

Hobbies In Action—\$25 Award Winner



Noted ATH contributor Cal Smith launches his R/C Monocoupe (featured in '55 AT Model Annual) and loses cap in fine action shot by Bill Dean. In spite of late-afternoon overcast sky, new super fast Kodak Tri-X film (200 Weston rating) enabled opening of f/5.6 at 1/500 with Rollei.

XYZ .29's—eleven in all. How much can the club buy these for so they can be included in the prize list? Manufacturer XYZ quotes some very reasonable figure in order to accommodate this wonderful club and to help it put on a successful meet.

So one day while opening his mail the engine maker spots a money order for 11 XYZ .29's at the special contest prize price. Engines are shipped out. So eleven fellows show up at the flying field on such and such a date, make some token flights and then each collects his XYZ .29 . . . for which he paid probably the manufacturer's actual production cost price. A neat idea—no?

No—and we'll tell you why.

Word has gone out through the model industry of such practices. From now on to qualify for merchandise awards—unless a club or contest is already well known to the manufacturer—you'll have to offer convincing evidence that yours is a legitimate competition and that your request for awards is a proper one. Tough, hey? Well, that's how it goes—a couple of "clever" clubs can affect us all.

Here's what we are suggesting. If your big meets are sponsored by some civic, military or service club in the community let the club officials make the request for prize awards. Ask them to tell how the merchandise will be awarded, who's eligible to enter, how widely the contest will be publicized and so on. If your club puts on the meet itself be sure to give some convincing evidence that all is according to Hoyle. A lot of folks have been stirred up over this prize situation.

Forewarned is forearmed, we say.

Calling School Clubs. Willis C. Brown of the Office of Education in Washington, D. C., is disappointed in that he's heard from only 24 school model plane clubs. Surely there are more than that across the country. Mr. Brown lists all

school clubs and arranges for exchange of information. School officials or school club officers should contact Mr. Brown as Specialist for Aviation Education, Division of State and Local School Systems, Office of Education, Dept. of Health, Education and Welfare, Washington 25, D. C.

Money Awaits. Got some money for a couple of artistic designers. These two chaps placed in recent ATH design competitions: Billy Tilton and Pvt. John W. Rush. Write us, will you fellows? Give your old and new addresses. Come and get it.

Sincerely, Art. We always like to read other people's mail. Snoopy, we guess. And so we appreciated receiving copies of a letter from Douglas Shoenhals to AHC and the reply from AHC's Art Winston. They pretty much tell their own story. First, Doug's letter:

America's Hobby Center, Inc.
152 West 25th Street
New York 1, N. Y.

Dear Sirs:

My folks think it is foolish to build model airplanes. They always throw them away. What would you advise me to do? Please let me know.

Sincerely,
Douglas Shoenhals
Shattuck, Oklahoma

And here is the reply Arthur Winston, president of AHC, made to young Mr. Shoenhals. It's so good we wanted to share our copy of it with you. Maybe you know of some adults who would profit from reading it. . . .

Dear Douglas:

Our advice to you is not to leave home. Parents are wonderful people. They have been a part of the human race since the beginning of time and there are mighty few of us who have not had parents at some time or other, and been mighty glad of it most of the time.

So bear with your folks. They always mean well and act according to their best judgment, so be patient and listen and obey. When your



Dick McCoy, famous engine and car designer, races Nike in double garage. Short lines mean fast laps but are ample for test purposes. Dick has been designing for many years and is noted for his fast race cars.



Fran McElwee and his well-publicized 1 1/2-sized R/C version of ATH's first free flight "saucer." Power is "OK" Cub .14; area of "wing" is 500 sq. in.; wt., 2 lbs., 3 oz.; N.A. 2-tuber; Bonner Compound escape.



When Ole Swanson retired from the sea he started carving in white pine his old ships. From left: 4-mast sq.-rigged, 4-mast bark-rigged, 3-mast full-rigged, 2-topmast schooner and (in hand) 3-mast bark.

time comes to become a parent, you will understand why one of the most important of the ten commandments is "Honor thy father and mother."

But there is no commandment against trying to get your folks to change their minds. But in so doing, you must meet them on their own intellectual grounds. Why do they think building model airplanes is foolish? Could it be because:

- (a) You litter up your room or the house and don't clean up?
- (b) You leave your materials underfoot?
- (c) You don't finish your planes?
- (d) You can't afford it?
- (e) You neglect homework, regular go-to-sleep hours, house chores, etc.?

What are you doing to deserve being allowed to build model airplanes? Are you keeping your parents in a position of owing you something for the courtesies, help, and the respect that you advance? "Cast your bread upon the waters" and it will return.

Of course, not too many parents know what the hobby of model airplane building can do for their boys. How could they? They see the glue and balsa dust on the table and furniture and the incompletable parts underfoot. But there is much that model building does for a boy.

It teaches him to use his mind and his hands. It makes him more exact and painstaking. It keeps him away from mischief and bad friends.

Many famous Americans have been model airplane builders.

A prominent United States Navy spokesman has attested to the fact that 90% of all Navy pilots have been model builders. In fact, at a U.S. Naval Air Station each year flying activities are shut down for from 4 days to a week each year for the purpose of conducting the National Championship model flying contest. The U.S. Air Force thinks modeling is important enough to hold world-wide elimination contests at numerous air bases and bring the winners to compete at the Air Force Finals in the States.

Among prominent men who were modelers when they were boys are Maxwell Bassett, transport designer for Glenn Martin Aircraft; Leo Weiss who now employs over 1,000 people in his own aircraft accessory firm; Harry Poch, now one of the country's leading industrial plant designers; and Roy Marquardt, who operates the country's leading plant devoted to ramjet engines.

Others are Donald Douglas of Douglas Aircraft and George Page, one of the great airplane designers whose craft included the Curtiss racers and Hawk fighters.

These are just a few. There are thousands of important men in industry, politics and the arts who built model airplanes as boys. We ourselves ship thousands, yes thousands, of airplanes to young men in the armed services—soldiers, sailors, marines, air force. We have made single shipments of up to \$12,000 to United States bases in Guam, Japan, Morocco and places you've never heard of. It's great training for building up character and precision. We have supplied to Boy Scout groups all over the world and to hospitals, both private and government. It's great for morale.

Show this letter to your folks, Douglas. Who can tell?

Sincerely,
Art Winston, President
America's Hobby Center, Inc.

Some forceful thinking for modeling there in Art's letter. For instance, are we excelling in those regular household chores that befall any young fellow? If we are to expect patience and understanding on the part of our folks, we should certainly be holding up our part in the family scheme of things.

Hail to the Team Racers! Bulletin just in from the F.A.I. via England's Society

of Model Aeronautical Engineers contains official international rules for control line modelplane team racing. Think of it—in just a few short years control line flying has made a tremendous impression around the world. And now team racing has been established on an official international basis.

For detailed F.A.I. T/R rules contact the F.A.I. representative in the U.S., the A.M.A.

It's The Finish That Counts. As the owner of a 61-plane collection of quarter-inch scale plastic planes, William T. Eville of Athens, Ohio, wants to take Bill Grove to task for a statement in his recent article on painting plastic planes, to wit: "There is rather an equal distribution of kits with and kits without landing gear."

"Not so," reports Bill Eville. "At my last count there were 97 kits being sold on the market. Only 33 of these kits do not have landing gear. Seventy-two of these kits are 1/4" scale and only 19 of that group do not have wheels."

"I also find that painting the entire model helps preserve it. After about a year the surfaces of a plastic model which were unpainted tend to get very dull. I also prefer to paint silver planes silver and navy planes navy blue to eliminate the flow-lines which show in the metallic-colored plastics."



Fire extinguisher nearby would have saved this Dyna-Jet powered French "Mystere" jet fighter. Lawrence Nuesslein took shot after engine backfired. Sad case since plane was really pretty.

Revamped Dmeco Stunt Wagon featuring two Fox .35's built by Joe Pedrant of West Englewood, N. J. Photo by G. T. Augustine. Looks like this double-barrel design could really git up 'n' go, no?



Art teacher William Shelley at San Francisco State College has real feeling for 3-dimensional representation. He's shown assembling all-paper figures for a 1-man show. Rabbit stands in center, alligator in back.

tion to everyone in their city or town and when they set aside certain areas for special activities, these facilities must be used or the officials are then open to criticism of favoring the few.

So it actually adds up to making sure that you, your model building friends and club members do utilize to the fullest extent possible any special model operation sites that are created for you. A final thought on this subject—if you are ever presented with a flying field (let's say U-control circles) and because of little use the site is withdrawn, it'll be a lot harder to get it reinstated than it was to secure the privilege in the first place!

—THE DOPESTER
(Continued on page 81)

Old Timer Reports In. Had phone call from Herb Greenberg, once well-known member of Bamberger Aero Club of Newark, N. J. Herb, a Naval reserve pilot, works with the Thomas A. Edison, Inc. outfit in W. Orange, N. J. as a mechanical engineer assigned to the aircraft fire detection and sensitive relay field. Now back in the fold tinkering with radio control planes. Holds ham license W2CTD. Lives in Livingston, has two youngsters. In post-WW II flying he racked up 26 minutes, 40 seconds indoors at Lakehurst air dock with microfilm stick model.

New Navy Model HQ. The Navy in Washington has appointed the Naval Air Reserve Training Command (CNARESTRA) as the official model airplane project command and Lieutenant Commander William G. Neville stationed at Glenview Naval Air Station, Ill., has been assigned as project officer. Cdr Neville is interested in keeping informed on all phases of America's model aviation program and has asked the Academy that clubs place his name on their mailing list so he can receive their bulletins. He should be addressed as: LCdr William G. Neville, Model Aviation Project Officer, CNARESTRA, N.A.S., Glenview, Ill.

Big City Modeling. Readers of our letters column will recall Seymour Brown of the Bronx, N.Y. Seymour runs Brown's Hobby Center which is located opposite big Van Courtlandt Park. He was instrumental in obtaining temporary control line facilities for modelers. Now he advises that due to the increase in number of modelplane flyers appearing at the Park, the New York City Park Department has decided to maintain the facilities on a permanent basis. It's been designated the Wiley Post Model Airplane Flying Field and is open all year round, seven days a week, 24 hours a day. Permits may be obtained to run U-control contests.

If race car enthusiasts will contact Joseph Forschay in the administrative building of Van Courtlandt Park and advise of the required dimensions for a model track, Seymour says that it's a pretty certain thing that the Park Department will construct one. Writes S. B., "These happy events are due to the untiring work of Mr. Forschay . . . local community centers and the good behavior of the model builders using the aforementioned areas. As long as the Park rules and regulations are complied

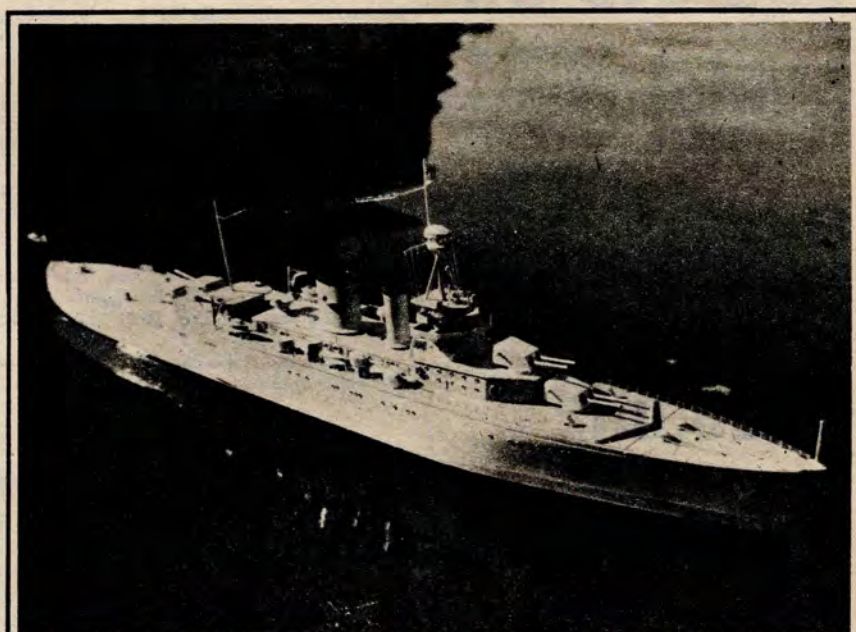
with, more and more area will be devoted to the use of the model builders. Van Courtlandt Park has a lake that can be utilized for model boats. After the Park Department has the race track built and completed, I will put in a request for the lake to be used for sail boats, powered boats, R/C, etc."

This is a happy ending to a lot of hard work on the part of many interested individuals. We salute them all and pay special tribute to the Park Department officials who have demonstrated such a keen appreciation of the benefits of modeling activity.

In checking around the country we have seen evidence on many occasions where facilities were set up by the "city fathers" for model builders after much hue and cry, then these facilities get very little use. Usual consequence is for the facilities, site or flying privileges to be withdrawn. It must be remembered that community officials have an obliga-



Eight and half pound jet powered DeHavilland Vampire built by Howard Yongers of San Mateo, Calif., has been clocked at 72.3 mph. Howard, member of Peninsula Prop Twisters, is one of top Coast scale modelers.



Most Realistic Model—\$25 Award Winner

G. Sutton-Jones of Salinas, Cal., constructed this 3-foot electric-powered model of H.M.S. Ajax, a British cruiser. His only complaint is that she's a bit slow; nevertheless a crowd always gathers when he operates the boat. G.S.-J. has some other nice craft which we'll present in coming issues.



Splendid example of model with a copper-sheathed hull is this "Benjamin Packard" sailing vessel. Upper portion of hull was finished in Japan colors while that under the waterline was covered with hundreds of small pieces of .002 inch thick copper sheet. Applied with care, these tiny pieces give strong feeling of authenticity.

If you ask the "old-timer," the chap who has been building ship models for fifty or sixty years, how to finish a model boat, he is bound to recommend oil paints. These are the same oils that artists use when painting on canvas and are available in tubes. Oil paints are easy to apply but require a comparatively long drying period, at least four hours. As with all colors the wood hull must first be prepared properly before the paint can be applied. Incidentally, one of the advantages of oils is the fact that the finish is dull, thereby accurately simulating the finish of the full-size ship in the case of a scale model.

Either balsa or pine or even a mahogany hull can be painted with oils. Most oil-painted hulls are carved from pine, however. All hulls should be sealed as previously described, although many experienced builders seal the pores of their pine hulls with very thinned out flat house paint, sanding well after each application in the same way as with the special sealing liquids. Complete the hull by brushing on the thin oil colors.

Oil paint on bare pine hulls is the practice of many older ship modelers. They merely continue applying the artists' colors, with light sandings after each coat, until a good finish is obtained. This is quite a lengthy procedure and apparently stems from the old days when very little was known about grain sealers. Although the results of this process are good the going would be quicker and easier with wood filler base.

All oil colors should be thinned considerably with rectified turpentine to a water consistency until they can be brushed on with ease. It is wise to experiment with the thinned oil on another surface other than the model in order to determine the correct amount of turpentine. An excessive amount of turpentine or oil will dry to a finish that will either rub off or never quite dry at all. This thinned paint must be applied in as many as ten coats for a truly professional appearance. Never try to rub down oil paints with rubbing compound; merely sand lightly with 8/0 sandpaper. Use this dry on oil paints. Do not sandpaper the last coat.

Numerous model boat experts use Japan colors on their craft instead of artists' oils. These are often called sign writers colors and are handled in the same manner as the oils. Both types of paints are sold in artist supply stores.

More Secrets On Model Boat Finishing

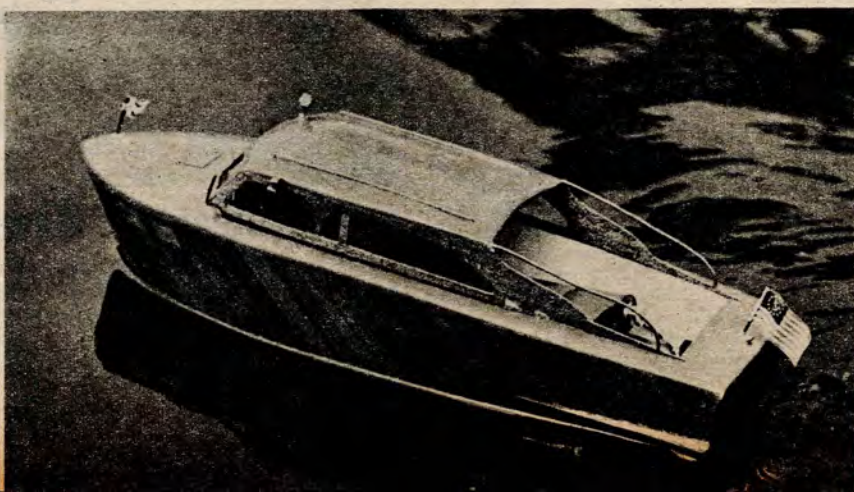
■ Our previous article in this series covered two phases of model boat finishing: the use of airplane dope on balsa hulls and natural-finish mahogany hulls. We conclude our research report on model boat finishing here with studies of airplane dope on pine hulls, use of artists' oil paints, how to make scale-like copper-clad hulls, and finally protecting that finish which you have worked so diligently to apply.

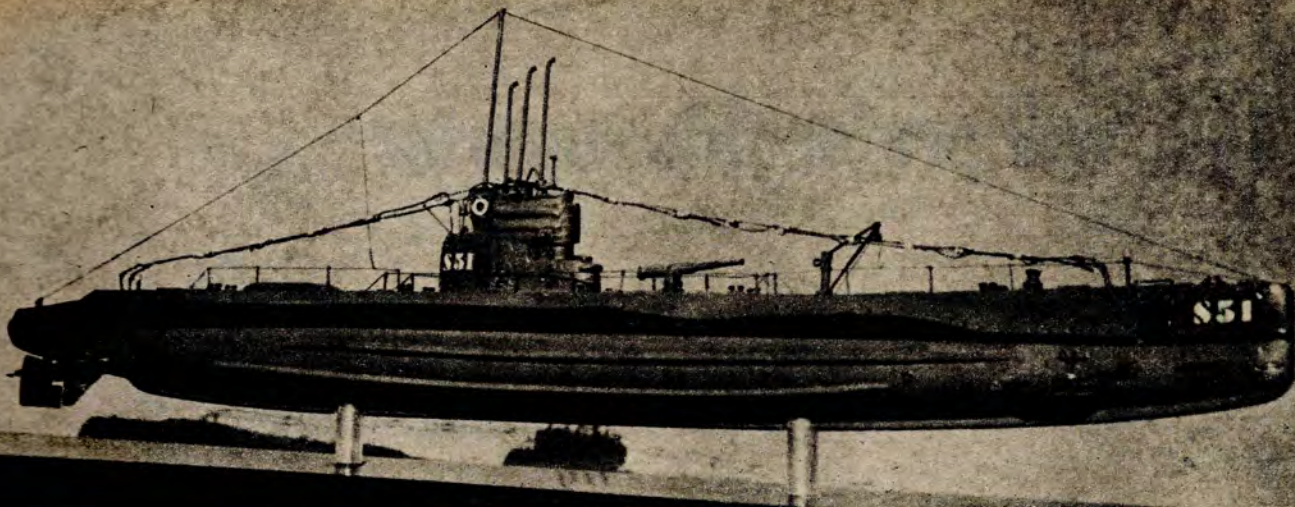
Pine and similar woods are often used for model ship hulls of both operating and exhibition types. This wood is much more durable than balsa and requires less wood filler than its softer cousin. Any of the wood fillers described for balsa hulls can be used on pine. These should be thinned, however, before they are brushed on. On the average white pine hull it is advisable to apply at least four coats of 10 percent thinned Aero Gloss Balsa Filler Coat, Aristocraft Wood Filler or Testors Sanding Sealer. Sand lightly after each coat. As usual additional sealer should be applied if the surface is not smooth after the fourth coat.

The colored dope should be applied in the same manner as for balsa hulls.

By **WALTER A. MUSCIANO**

Model airplane liquids were used for this natural mahogany finished cabin cruiser. Numerous coats of Testors Sanding Sealer sealed the wood. Models of similar construction need not receive any other treatment, since such a sealer produces a fine finish which serves very well as the final coat, too. However, should you so desire you can add a coat of clear model airplane dope to bring up the gloss.





This operating model of U.S. Navy sub S-51, which required a thoroughly waterproof hull, received 11 coats of Aristocraft airplane dope. Six coats of Aristocraft wood filler served as a founda-

tion. In view of the possibility of water leakage through the hatch while submerged, this model was thoroughly waterproofed on the interior as well to prevent water from swelling the hull.

Almost up until World War I virtually all wooden-hulled full-size ships had copper-clad bottoms. The entire hull below the waterline was covered with copper sheets to repel destructive wood borers and to retard deterioration of the wood planking. This condition is usually simulated on models by painting the bottom with gold-colored dope or with a mixture consisting of a small amount of Baer's Copper Bronze powder and light-bodied silk screen varnish which is available at artists' supply stores.

The most realistic method of duplicating a copper sheathed hull is to actually cover it with copper! Many war surplus hardware stores and large hardware stores sell sheet copper. A thickness of about .002" is preferred. Cut the copper sheet into small rectangles about the scale size of the actual plates of the full scale vessel. The size of the plates generally were 14 inches by 4 feet, with the larger dimension running in a fore and aft direction. These copper plates are cut with scissors and can be applied after the hull has been completely painted by using model airplane cement as the adhesive.

Begin aft, down at the keel and work forward along the side. The plates should

overlap one inch full scale towards the stern and towards the bottom. Cement the aftermost plate in place and proceed towards the bow overlapping as previously mentioned. As the rows of plates progress upward it will be found that a curved line results from stern to stern. This must be corrected at two specific intervals by cutting the lower portion of the plates at an angle until the line straightens. Now proceed as before with rectangular plates until the curve comes again. The copper should terminate with a straight row of plating at the waterline. Small smooth sticks can be used to press the copper smoothly to the hull.

If the model is of large size, small straight pins or nails can be pushed into the copper plating to simulate nails. This effect can be had on the smaller models by making small shallow indentations in the plates with a sharp point or pin. A well-sharpened gear wheel from an old watch or clock is an ideal tool for making these indentations. This insures an even spacing of the marks by running the gear along the seams.

A corroded effect can be had by wiping the plates with an acid after the hull is completely clad. This requires much

patience and is intended only for the most meticulous model boat builder. Wiping the plates with a light green paint can simulate corrosion.

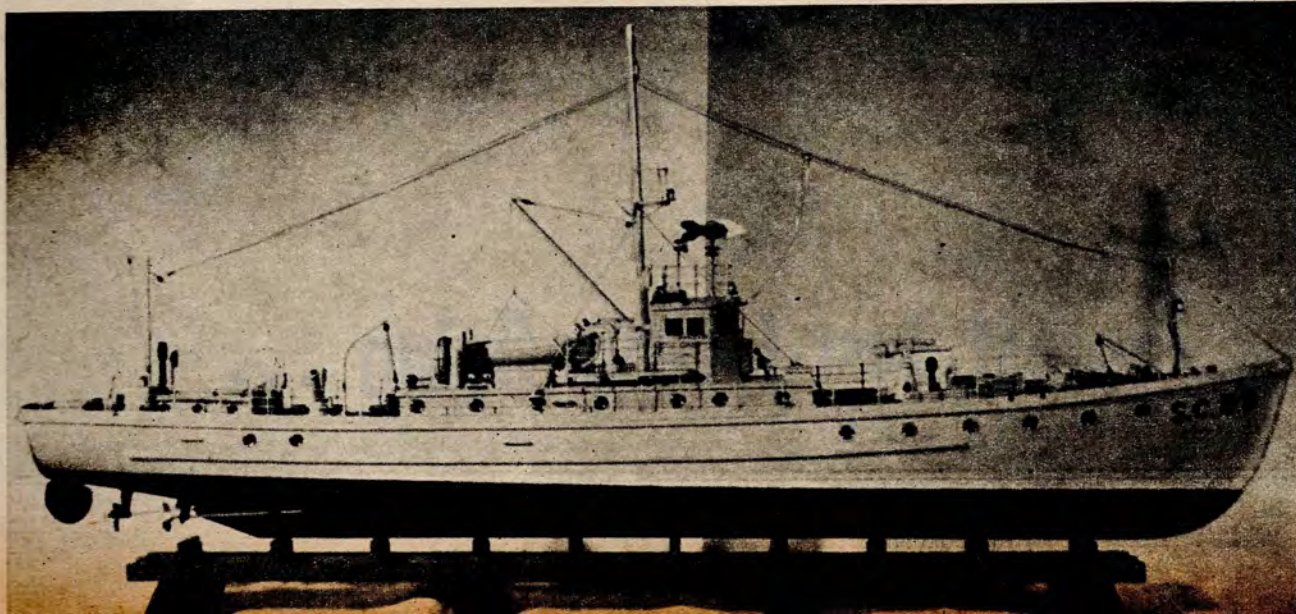
Operating models, naturally, suffer more abuse than exhibition cousins. Internal combustion glow plug engine installations require a well-finished engine compartment interior which will not absorb the splashed and spilled fuel. The absorption of these fuels will, of course, weaken the structure and ruin the paint job.

All models with glow plug engines must have a finish which is impervious to these alcohol based fuels. The finish could be protected by a coat of transparent fuel proofer; however, it is found that this scrapes off during handling at the local pond. Fuel proof colors are recommended for these boats. Pactra Aero Gloss in jars or spray cans, Testors Sta or Butyrate Dope and Aristocraft Fuel Proof Dope are some of the fuel proof finishes. It is suggested that the cement and wood sealer also be fuel proof and made by the same manufacturer as the final finish.

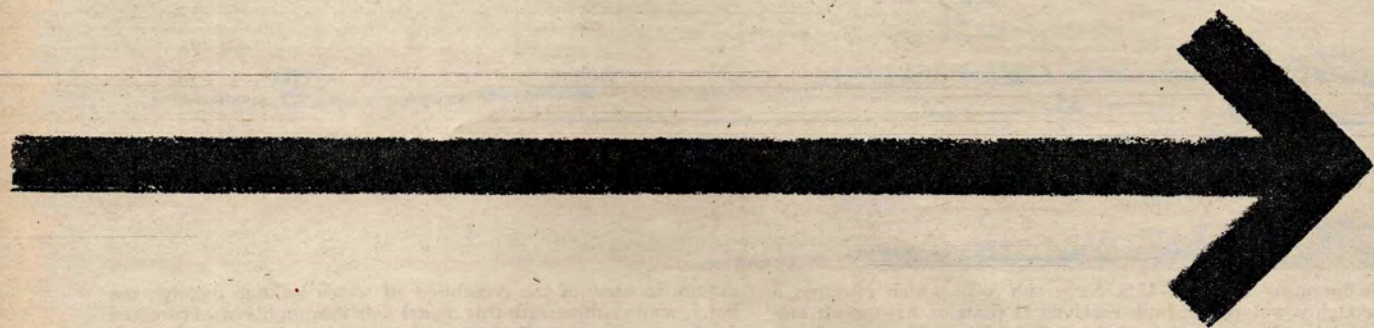
Steam-powered vessels should have well-finished engine compartment interiors as (Continued on page 71)

Artists' oil colors with very thin flat white house paint comprise the finish of this triple-screw replica of a World War One sub chaser. Four coats of flat white with intermittent sandings pro-

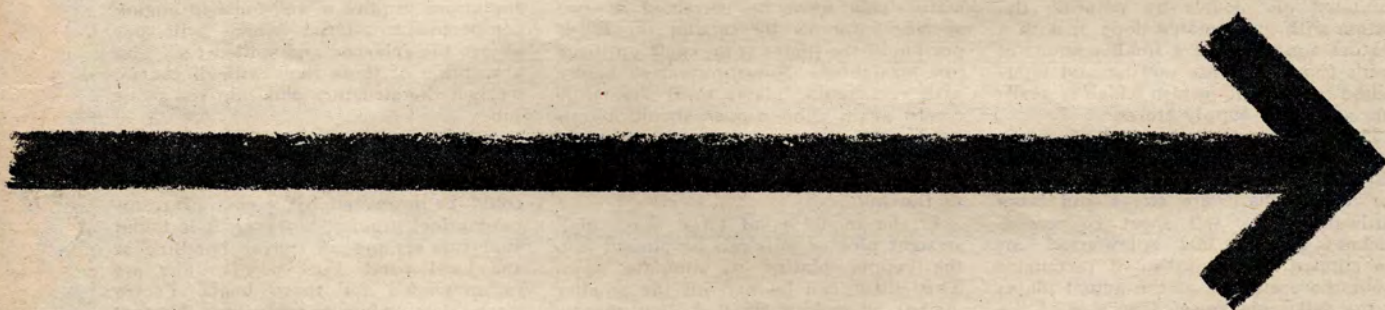
vided base for six coats of oil paint. Hull was carved from white pine. While it is much easier to use a wood filler and save time, some oldsters still employ oil colors, which give flat, old-time finish.



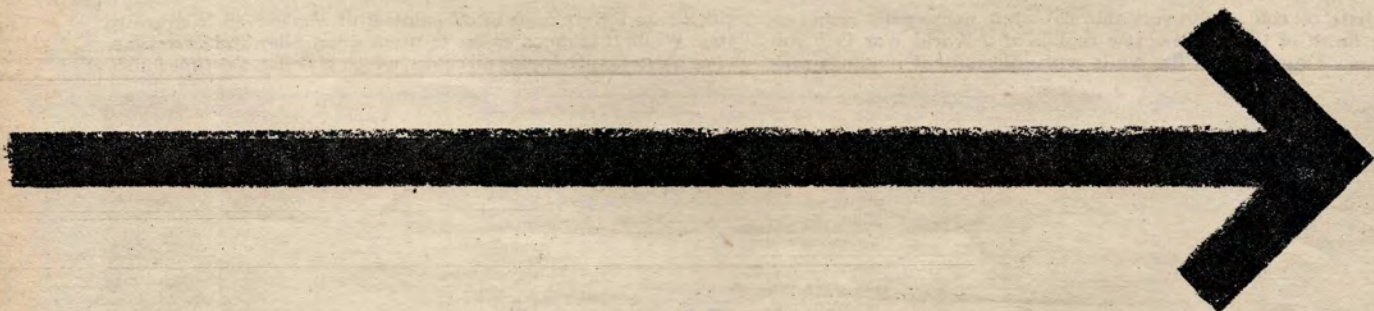
You, too, will prefer this superior



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stunt, contest, just-for-fun flying ...

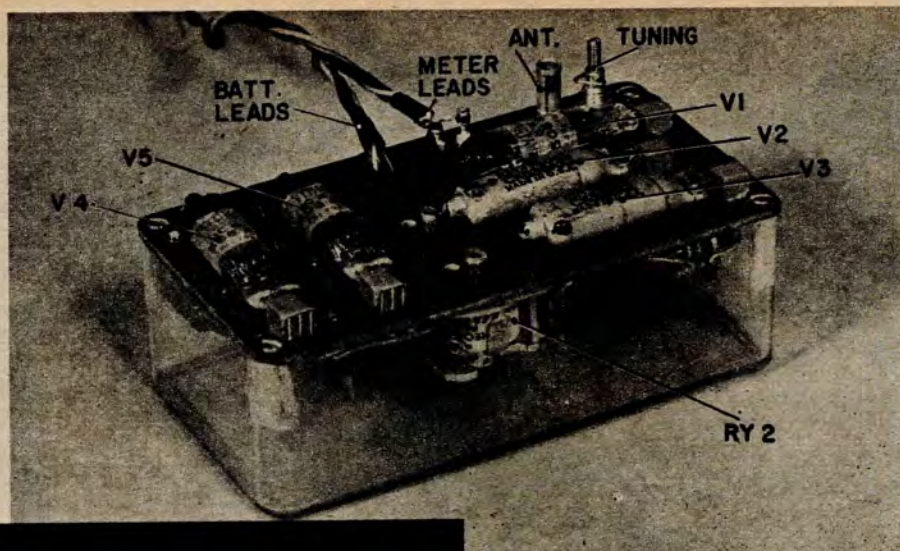


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Radio Control Fan—
The Lightweight,
Constant Carrier Band Pass . . .

TWO-CHANNEL "TR" RECEIVER

Everybody gets in the act;
it turns out to be a big hit!

By VERN S. JUENKE

Note to the Editor: When we first saw this receiver in action at the Nationals, and got the data on it from Howard Bonner, we felt it would be of real interest to large numbers of R/Cers. Howard didn't feel he should write up the receiver as an article, however, since it had been originally developed by Vern Juenke. Vern, though, had only used his original version that would not work very well with the Babcock transmitter, and because we felt the receiver would be of most use to our readers if it could be operated by this widely available and standard make of transmitter, we decided to use the Bonner version. To see just how effective this would be, we built one up, and it is this one which appears in the photographs. The ensuing data, then, is the result of cooperation between Juenke, Bonner and Yours Truly, and we feel this receiver is one that will start a new trend in lightweight multi-channel operation.

—H. G. McENTEE

■ During the past few years there has been an ever increasing desire among serious radio-control modelers for a lightweight reliable two-channel receiver. The big problem in the past has been the weight factor involved, both in the necessary tuned filters, and in A and B battery drain. We feel we have such a

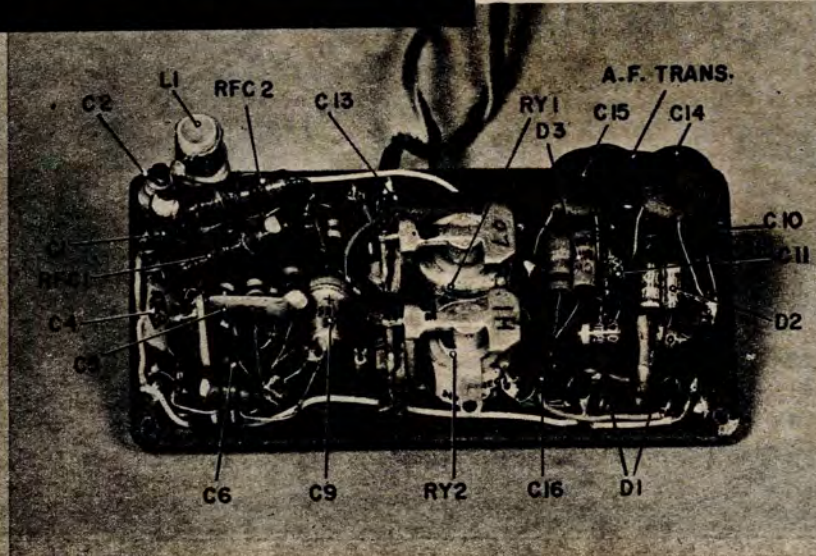
Note compactness of tiny tuned relay 5-tuber. Although this is an audio-selection receiver there are no audio frequency chokes.

receiver now, and as proof of its worth, the 2nd and 4th placers at the hotly contested 1954 Nationals R/C event both used this receiver. Second-place man Howard Bonner's receiver was very similar to that illustrated here, while Colby Evett used a 50 mc. version. To show that the receiver will go in small planes Bonner used a little 3 lb. Beam; the receiver makes small multi-control planes very practical, since it weighs only about 4½ oz. The tube line-up shown can be altered to lower battery drain, too, but it was felt that the readers would be most interested in the receiver as depicted, for this is the version that has been so successful in both contest and sport flying.

Technically, the receiver might be called a constant-carrier band-pass job; five tubes are utilized, the first three being a standard super-regen. detector V1, a voltage amplifier V2, and an AF output tube V3. The remaining two tubes operate the relays, and it is here that some most unusual circuitry may be seen. Although this is an audio-selection receiver, there are no AF chokes. Instead, the two relays are tuned to the desired frequencies; since they tune very broadly, it is possible to work both relays at once, by sending a suitable intermediate tone.

A look at the curves in Fig. 1 will show roughly how this works; the high-tone channel—1600 cycles—goes to a greater value of current, since the relay for this circuit is only 5000 ohms. Both relays receive enough current so that relay settings are not critical, and enough spring tension may be used to prevent vibration troubles.

There is a DC feedback arrangement in each relay tube plate circuit. The tubes are normally biased close to cut-off by the 9 V. battery. When an audio tone of the desired frequency comes through, it is amplified by the tubes; if it is the correct high tone, for example, the tuned relay RY2 in the plate circuit of the high channel acts as a high impedance to the amplified AF, blocking its passage to ground through the B battery. The AF therefore builds up a positive DC voltage across the two diodes D3 and 1 meg. resistor R2, which voltage is passed back to the grid of the tubes, allowing V5 to draw a lot more plate current.



Vern Juenke of Reno, Nevada, a 29-year old gunsmith, is president of the Reno Dazed Diodes R/C Club. First flew free flight in '41. Married, has 2 daughters.

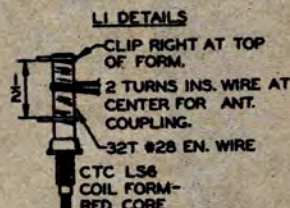


Fig. 4

Fig. 3

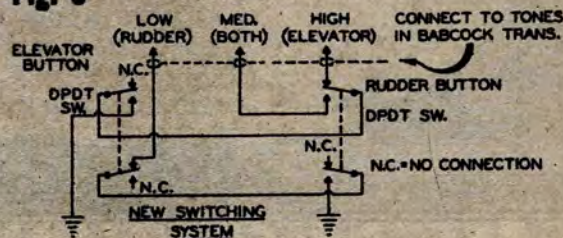
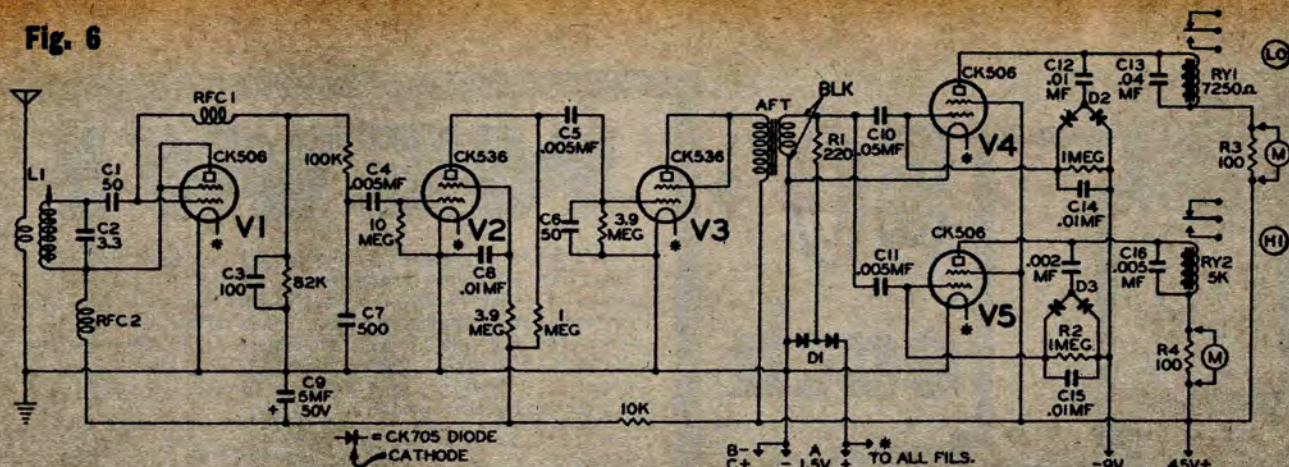


Fig. 6



This feedback merry-go-round continues until the tube is drawing the maximum plate current possible, for the value of B voltage in use. Of course, the low frequency tube amplifies the tone at the same time, but since its plate circuit is not resonant at the high frequency, what little AF it passes goes on to ground through the relay RY1, its parallel condenser C13 and the B battery.

Before we get into actual construction, there are a few conclusions that should be offered. First, the receiver is primarily useful as a selective job that will work on either of two audio tones; because the tuned circuits are so broad, there is nothing at all critical about operation. Drift of the tones at the transmitter, hot or cold weather, and even dropping battery voltages that might shift the tones, make absolutely no difference in operation. The first receivers of this type that were used had a somewhat different circuit for the first three tubes, and the transmitter was a home-made grid-modulated job. However, when Howard Bonner wanted a two-channel receiver for his new Beam, it was found that the receiver "front end" did not work so well with the standard Babcock BCT-4 3-channel transmitter. Since Howard did not want to build a new transmitter, he adapted the front end of the Babcock 3-channel receiver to the tuned-relay output arrangement, changing the tubes to sub-miniatures, and altering a few component values to fit these tubes. With a little further simplification,

this is the receiver which we show. Since it will work very nicely with the Babcock transmitter, we do not describe any special 3-tone transmitter here.

You will note that we have mentioned only two channels so far. But the Babcock has a third tone in between those high and low ones which work our two relays—can we do anything with this third one?

The answer is both yes and no. As the Babcock transmitter comes, the middle tone (about 720 cycles) is a bit too low for good simultaneous operation of both relays. Also, for most uses (as for example the single or simultaneous operation of two Compound escapements, as on Bonner's Beam) a different switching system must be used. Both these problems may be taken care of quite easily, as will be explained in detail later. Suffice to say, by raising the middle tone and adding a special switching hookup, the Babcock transmitter can be adapted quite well to simultaneous operation. There's one caution on this, though; *any tampering with the insides of the Babcock transmitter (or any other reputable make, for that matter) will void the maker's guarantee.*

So—you can use the transmitter as it is sold, and get very reliable two-channel operation; you can tinker with the receiver circuit a bit (data on this later) and still using the transmitter as it comes, get perfect two-channel operation, with fair simultaneous use.

Or you can add the double-button switching system and raise the middle tone, and get pretty good simultaneous action. Users of this receiver have found the high and low operation to be most reliable; the simultaneous operation of both relays on the intermediate tone is considered as somewhat of a bonus—useful, but don't stake your life (or that of your plane) on it. Of course, if you want to make your own transmitter, you can set the frequencies as you like, for best overall results.

The receiver is built entirely from standard parts. We haven't given highly detailed drawings of the chassis, Fig. 2, since this receiver is something that we would not recommend for the beginner to tackle. Parts placement has not been found critical, but the usual techniques of reliable receiver construction should be followed. Howard Bonner mounted the bias battery right in the receiver—taped to the audio transformer, while it is external on the outfit shown here.

The five sub-min tube sockets are held to the base plate by the prongs that pass through, and also by an application of a substance known to the model railroaders as Walther's "Goo," obtainable at most hobby stores. After the set has been checked out and is ready for installation in your model, a spot of Goo will hold the tubes securely to the base; if you want to remove them at any time, a razor blade will do the job, since Goo never gets really hard.

(Continued on page 88)

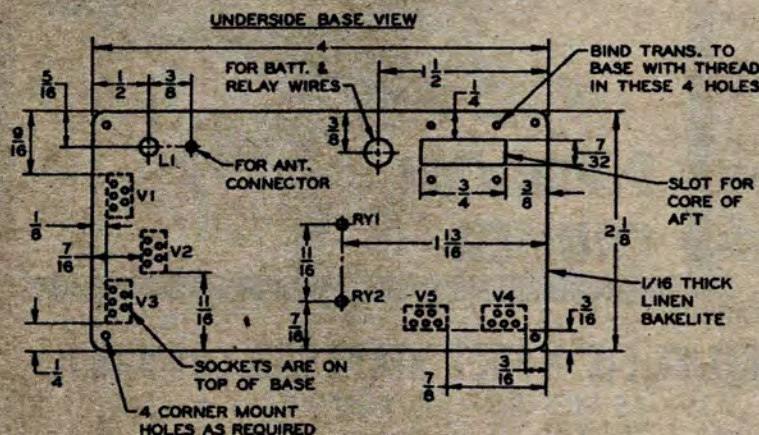
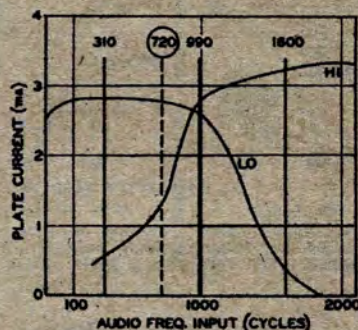


Fig. 2

Fig. 1



MODIFYING GYRO "R.C." CHOKE

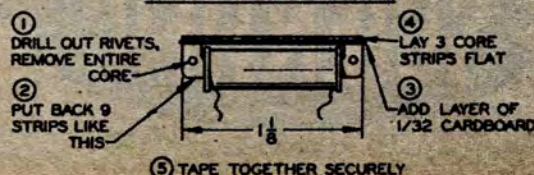


Fig. 5

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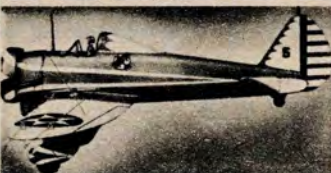
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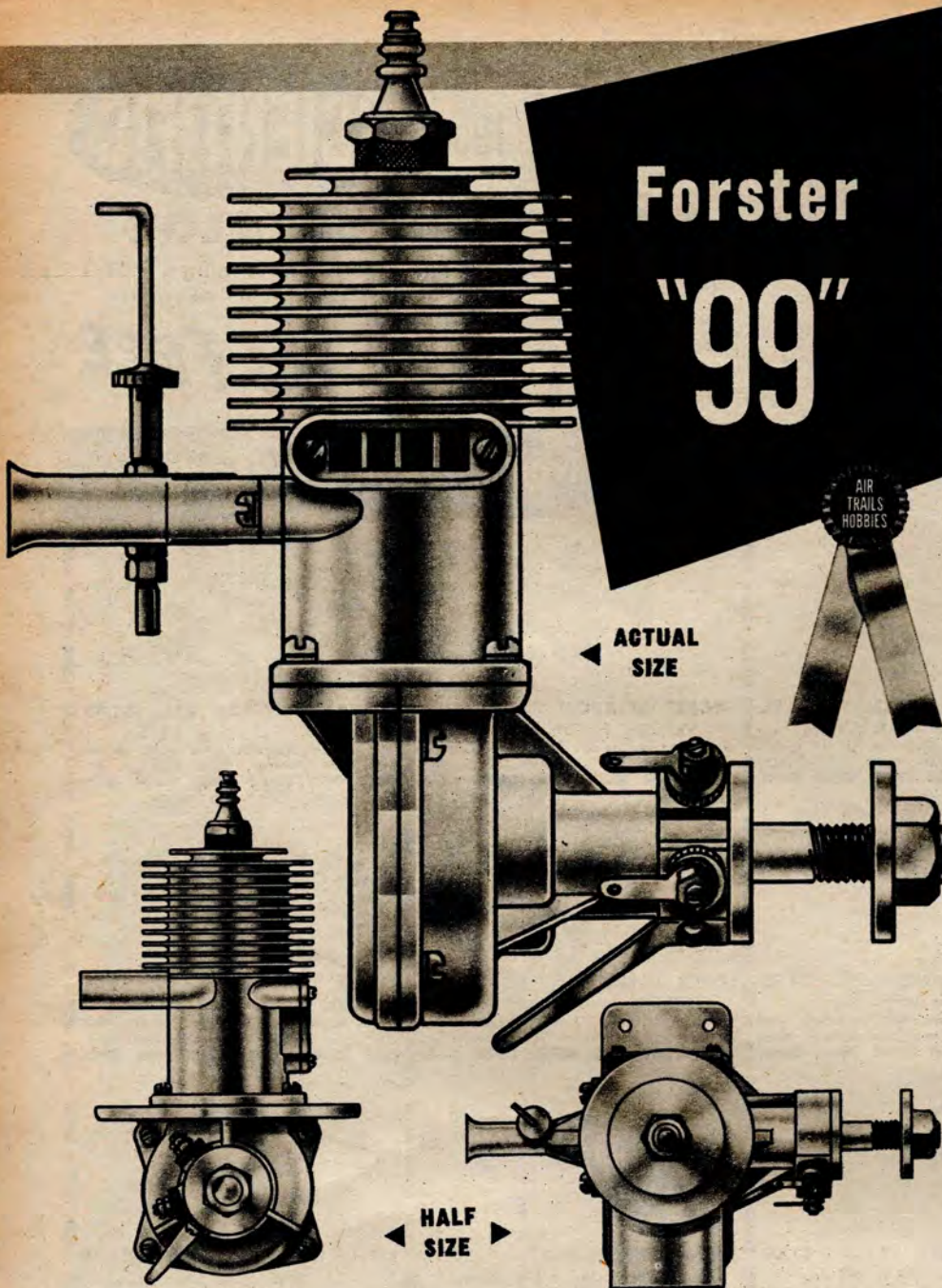
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■ Old-timers in the sport of flying model airplanes and radio control enthusiasts especially should be pleased to know that the "Mr. Big" of all model engines is once again being produced in limited quantities. Mention of this famous Forster Brothers product brings back fond memories of those jumbo-size jobs that performed so much like the real thing.

Now that radio control has brought us full circle to the pioneer low and slow school of thought, the powerful moderate-speed Forster .99 cubic inch displacement ignition engine should again come

into its own. So if it's power you're after, this .99 may well be the answer.

Forster Brothers, organized long ago in 1932, is one of the oldest established active model engine manufacturers in the U.S.A. The engine covered in this report, widely known as the "new series" .99, first appeared in March 1947. Later, because the greater part of the factory time was taken up with defense work, non-military engine production necessarily had to taper off. Unable to produce all its various model engines at the same time, the Forster concern decided to drop the more costly .99 from its line.

Now that production of this engine has resumed, at the present time only the air-cooled version will be produced. However, if sufficient demand is created water-cooled models will be added. A special "double-ended" water cooled

model with the power take-off at the opposite end from the timer, as an extra, is also being contemplated. You model boat fans should really go for this one in a big way.

The new series .99, although similar to the original model, has been improved through use of a new hardened and ground crankshaft running on a ball bearing, a new carburetor, larger and faster porting and a new exhaust stack. These improvements boosted power so that the .99 now develops .688 horsepower at 7,700 rpm. This engine is without doubt the most powerful single-cylinder moderate-speed powerplant available today.

Design and construction-wise the .99 has features not generally found in production engines. The cylinder, having exceptionally deep cooling fins, is made of aluminum alloy and is die-cast around a steel machined liner. This bonding method, according to Forster, insures good heat transfer between the cylinder liner and the aluminum cooling fins.

The advantage here goes deeper than may appear on the surface. As the molten aluminum cools and contracts around the steel liner, it contracts with great force. This actually "springs" the liner a measurable amount. Such "spring" is released as the engine heats up in operation, due to the difference in expansion of the two metals, thereby giving the piston an increasing running clearance.

The "T" section aluminum alloy connecting rod is "Oilite" bronze bushed on both ends. The hollow wrist pin is precision ground and retained by steel-spring snap locks much the same as on large aircraft engines.

The piston is cast from "Lo-ex" piston alloy and then machined. It carries one compression ring and one oil ring. The steel crankshaft is fully counterbalanced and employs a hollow crankpin. An aluminum cap retainer fits into the hollow crankpin and a flange on its outer end keeps the connecting rod on the crankpin in perfect alignment.

The two-piece crankcase is die-cast of aluminum. It is fitted with both a ball bearing and an "Oilite" bronze bushing. This bushing, vital to maintaining a good compression seal, features an oil groove to insure proper lubrication at this spot.

A fully enclosed two-speed timer is fitted to the forward end of the crankcase. (For those of you not familiar with ignition engines, this timer is an ignition timer, not a flight timer as used to limit engine run.) Being an ignition engine, the .99 operates on a mixture of gasoline and oil which is fired by an ignition system consisting of a coil, condenser, batteries and a spark plug much like the system used in your family automobile. In order to control the point or time at which the spark plug fires, a timer must be used. This timer takes the place of the distributor as employed on your car engine or any multiple-cylinder gasoline engine.

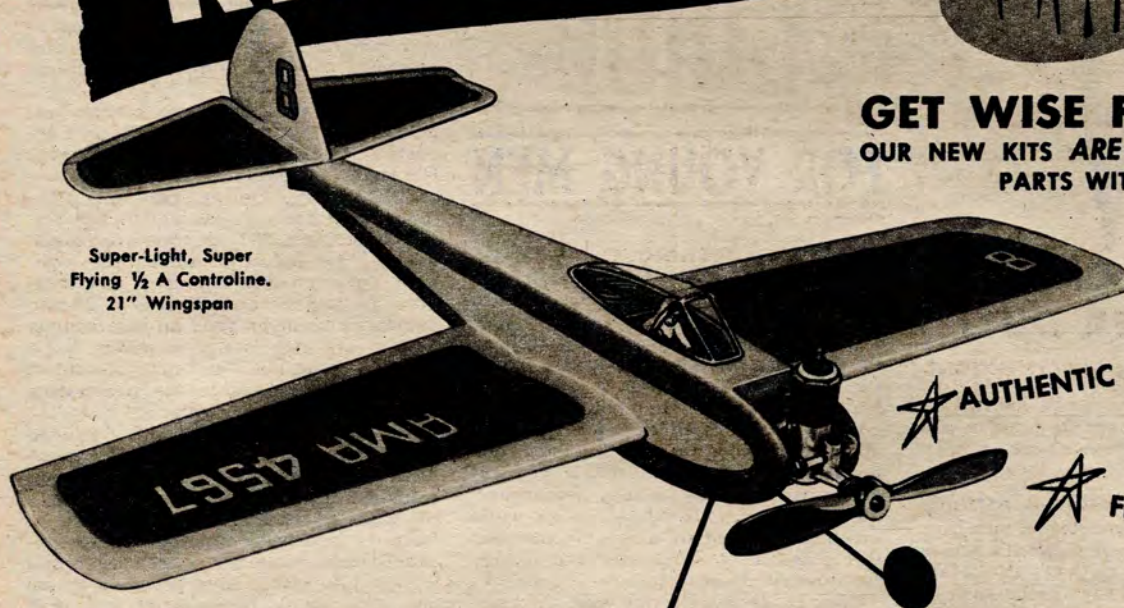
On the .99 the timer consists of two separate sets of tungsten contact points which are (Continued on page 71)

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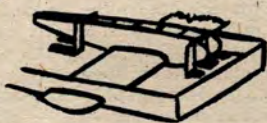
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JOB CAREER SCHOOL GUIDE FOR YOUNG MEN

WORCESTER TECHNIQUEST. How can you find out if engineering is really the career for you, or learn what branch would be the best choice in your case? What are the different courses at college like? What's it like in industry, where the engineer is employed? You'll need to know some answers in both these categories—school training and practical application—in order to discover the possible relations between you and engineering. One way to help answer such questions in a first-hand, worthwhile manner is offered by a ten-day program this summer at Worcester Polytechnic Institute, Worcester, Mass.

Now in its seventeenth year, "Worcester Techniquet" is a self-orientation program open to boys anywhere who have completed their third year of high or prep school, or graduated from such schools. No attempt is made to enroll you at the Institute, or even to enter engineering. There are no assigned studies, no exams. The idea is simply to help acquaint you with the field of technology. The dates this year are from June 22 to July 2. The fee is \$75, covering all expenses. Here's what you get in return:

You watch college students at work (summer practice courses are in session at the time)—surveying and mapping, making machine parts, carrying out hydraulic tests, analyzing materials, experimenting with various engines, dynamos, steam boilers, pumps. You take part in a number of these operations yourself, under supervision.

In addition to this campus activity, you go on inspection trips to get the industry side of the picture. You visit a modern mass-production factory, you watch big construction engineering jobs—with detailed explanations furnished by experts.

In the evenings there are informal discussions about the various branches of engineering, about industries, courses, science or whatnot. You receive aptitude tests by a college psychologist, to help you and your parents decide where you would best fit in, or concerning the kind of education you should have; individual guidance interviews are given. You live in the college freshman dorm, two fellows to a room. You receive your meals in the commons in the same building. The college swimming pool, tennis courts and other athletic facilities are at your disposal.

Worcester Techniquet is not a money-making proposition, but a recognized service to education and the whole field of technology. Since it is meant to help

those most likely to gain from the program, a recommendation from your school principal should be sent along with the applications. Address applications to Prof. Claude K. Scheffey, Worcester Polytechnic Institute, Worcester, Mass.

RESEARCH is big business, and if you must have proof: Today more than \$4 billion per year are spent on organized research, and it employs 350,000 persons. Which is one of the reasons why there is so much opportunity ahead for you in science or engineering careers—not only because the growing research programs will need more personnel, but because such programs evolve new products and processes that call for more technical graduates.

To get an idea, have a look at the annual report of just one independent industrial outfit in this field—the Armour Research Foundation of Illinois Institute of Technology. During 1954 this non-profit organization conducted 538 research projects, 203 for the government, the rest for industry. Among the highlight developments were two new weapons for the Armed Forces—a 20-mm automatic revolver type aircraft cannon with a very high rate of firepower, and a 106-mm battalion anti-tank recoilless rifle which has double the penetrating power of any existing rifle.

For industry, developments included such items as a portable whipping cream dispenser (operating on the aeration principle instead of high-pressure gas like CO₂), this found a warm welcome in bakeries and soda fountains), an improved semi-automatic coffee maker, and a portable, electrically powered grease gun. One study investigated and gave worthwhile suggestions on the railroad "hot-box" problem, another produced a new titanium alloy. And good progress was made in the several-year-old project sponsored by Elgin—new battery systems for the "Electronic Watch."

Ceramics, you ask? A leading development of Armour Research last year was a unique process called "Solution Ceramics," which allows the application of true ceramic coatings to almost any solid surface. With Dupont as the sponsor, the Foundation also looked into the advantages of mixing polyvinyl acetate emulsion in cement mortars—and found it increased three to four times the bond strength of brick to mortar, among other things. Again: the Arabian American Oil Co. contracted for a project whose purpose was to make use of native raw materials in Saudi Arabia for construction work. (Because portland cement is just too expensive over there.) The Foundation came up with a new lightweight 22-pound all-clay (native) building block.

Research? Heck, pardner, that's today's Frontier country, ready and waiting with gold in its hills for those who are willing to dig.

WHAT HAPPENS TO TECHNICIAN GRADS? We mean, of course, the graduates of technical institutes—or any of the two-year schools with post-High courses that train you to become a "technician" or assistant to the professional engineer. Plenty happens, and 99% of it good, according to a statistical report we've been reading about the Long Island Agricultural and Technical Institute at Farmingdale, N. Y. (This school is part of the State University of New York.)

One section of the survey followed the fortunes of the first class to graduate from the school's Industrial-Technical division, in 1948. Over a four and a half year period, or (Continued on page 64)

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▶▶▶▶ National High School Essay Contest sponsored by Advertising Federation of America and local member Clubs. Grand Prize \$500 and free trip to Chicago to attend Federation's convention June 5-8, 1955; other cash awards plus local prizes. Essay must not be over 1,000 words on subject "How Advertising Affects Our Lives." Contest restricted to those cities and areas having member Advertising Clubs, which conduct local contests that in turn lead to national contest. Contact local club for its closing date. National contest closes April 18.

▶▶▶▶ Industrial Arts Awards annual competition sponsored by the Ford Motor Co. More than 1500 individual awards valued at \$50,000 are given each year. Open to school students in grades 7

through 12 enrolled in shop, drawing or printing courses. For information write Industrial Arts Awards, Ford Motor Co., 3000 Schaefer Road, Dearborn, Mich. Far West entries close June 10; elsewhere June 25.

▶▶▶▶ Fisher Body Craftsman's Guild sponsors car design and model building contest. \$20,000 in scholarships plus numerous state and regional awards. For details write Fisher Body Craftsman's Guild, General Motors Bldg., Detroit 2, Mich. Closes June 1, 1955.

▶▶▶▶ First annual competition for papers on "upcurrents" offers a total of \$400; sponsor is the Munital Foundation, Inc.; the American Meteorological Society and the Soaring Society of America are cooperating agencies. Deadline for entries is May 1, 1955; inquiries should be addressed to Dr. Paul MacCready, Jr., 1202 E. Green St., Pasadena 1, California.

▶▶▶▶ Fourth Annual Science Achievement awards for Students, conducted by Future Scientists of America Foundation and sponsored by American Society for Metals. Program of 104 awards totaling \$5,000 for projects in science and mathematics, and open to any student in grades 7 through 12. Three divisions according to the grade you're in, and you compete only with other students in your geographical region. Closes May 15, 1955. For information, write to Future Scientists of America Foundation, 1201 16th St., N.W., Washington 6, D. C.

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Never before, anywhere, an authentic scale model PLASTIC boat kit like this! 73 jewel-like pieces, molded in 3 authentic colors, are easily assembled, even by beginners! Kit contains pieces, molded in 3 authentic colors, are easily assembled, even by beginners! Kit contains a wealth of authentic detail, from venetian blinds down to specially engineered parts for power base. And now . . . another first! . . . Complete with specially engineered parts for power operation—battery box, extra-power rudder and propeller, electric motor mount, shaft and stuffing box, etc. Simple, easy-to-read instruction sheet includes visual directions for assembly and power operation. Ask your dealer!

***All the authentic beauty of the full-sized vessel captured ON THE SHELF!**

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A RADIO CONTROL FAN'S DREAM! So tremendous, it can support 75 lbs. of added weight! Has over 2 sq. ft. of clear floor space for added equipment installation! Entire cabin instantly removable... but need not be removed to start gas engine. Internotched and self-aligning construction. Die-cut and African mahogany parts exactly as used on full-sized craft. Die-cut and embossed Gaboon mahogany simulated teak decks. Die-cut balsa frame members, etc. Authentic decals. Yachting Ensign. Venetian blind material. Complete set of portholes. Kit includes two each: shafts, stuffing boxes, rudders, rudder stuffing boxes, also right and left hand nylon propellers, nuts, bolts, etc. Includes a 16-page step-by-step illustrated instruction booklet, plus giant 38" x 50" illustrated plans... including power operation and radio control installation. Simplified construction assures fast assembly even for beginners!

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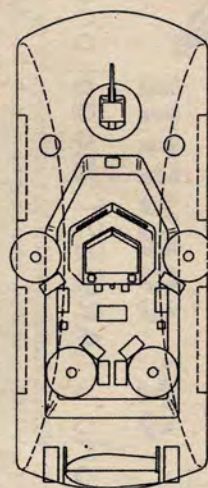
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Address.....

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Boat Design Competition

FIRST
\$50
AWARD



PT Boat with catamaran hull by George D. White of Cleveland, Ohio. This is a king-size patrol craft, heavily armed and capable of giving a good account of itself in battle. It mounts a forward 75-mm recoilless rifle, twin 20-mm cannons in gun tubs, four cal. .50 machine guns and four torpedoes. Power is supplied by two diesel engines of 2500 hp each. Construction is welded throughout. Top speed in calm water 50 knots, cruising speed 33 knots. Length 100 ft.

Hydrofoil boat by Pvt. R. H. Dons of Fort Sill, Okla. This is quite an unusual design, using for power steam generated by heat of nuclear reaction, fed through hollow struts to which small turbine engines are attached underwater. The turbines drive the propellers. Hull is built of titanium, struts and foils are of stainless steel. The craft is designed to operate in rough water, and is suitable for rescue or demolition work. Length 64 ft., hydrofoil beam 24 ft. 100 mph tops.



SECOND
\$25
AWARD



THIRD
\$10
AWARD

Amphibious jeep by Guy Hammel of Salt Lake City, Utah. An ideal vehicle for swamp and shallow water travel, it is powered by a 35 hp engine which drives it on land at a speed of 35 mph, with the rubber caterpillar treads. Without treads, using the four wheels, it is capable of 50 mph. As water craft, driven by the screw, speed is 16 mph. 12' long.

Rules governing this design competition are as follows: Profile (side), plan (deck) and (cross) sectional views of the proposed craft will be required, plus any detail sketches necessary to illustrate unusual features. Do not handicap yourself by submitting hull drawings less than 6 inches in overall length. Give sketches of craft from three-quarter front and rear positions. Photos of a model of the proposed design may be included. Information of powerplant(s), estimated performance,

dimensions and explanations of special features are required. Data as to age, occupation or schooling of the entrant should accompany each submission. Mail entries to Boat Design Competition, Air Trails HOBBIES For Young Men, 304 E. 45th St., New York 17, N. Y. Entry each month judged most practical or of greatest significance will receive \$50; \$25 will go to second place and \$10 for third. The editors regret they cannot enter into any correspondence or return entries.

Sky Scooter

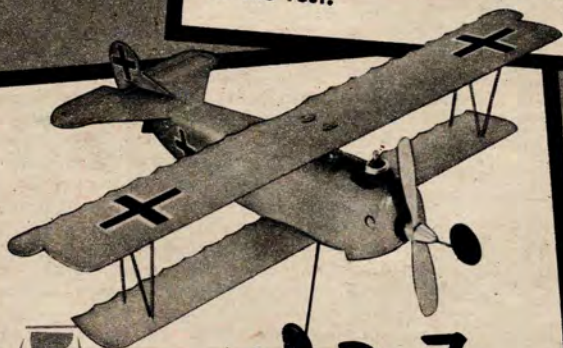
the world's first
all balsa flying model
that assembles without cement



A completely prefinished, prefabricated model that assembles in minutes. Unique design principles enable anyone to assemble this exciting new model entirely with their hands. No special equipment or cement is needed. A single bolt locks the major parts of the model securely — interlocking slots hold all the rest.

The kit is platform packaged complete with .049A Cub engine, prop, control handle and flying lines, decals and step-by-step pictorial instructions.

Wing Span approximately 18". At your dealer. **\$7.50** Complete kit, less engine \$2.95



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For the first time, a biplane in a prefabricated, prefinished kit, so authentic every aviation enthusiast will be proud to own and fly it. Featuring fully airfoiled and scalloped solid balsa wings, fool-proof upper wing and landing gear bolt mounting, all plywood tail, built-in rudder offset and finished cowl and fuselage parts. Packaged with all parts in a die cut platform including Cub .049A engine, control handle, flying lines, decals, and simplified pictorial step-by-step building instructions. Wing Span approximately 18". At your dealer. **\$7.50**

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SPIRIT OF ST. LOUIS
(no engine—24" span) **\$2.95**



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A new half-A stunt model completely prefinished for easy assembly. All parts are smoothly machined ready for use. The Super Ding features a symmetrically airfoiled solid balsa wing with a chord of 5 1/2" and is 18" long. Platform packaged semi-assembled with a Cub .049A engine, control handle and flying lines, decals and easy-to-use pictorial instructions. At your dealer. **\$7.50**

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HOBBY CALENDAR

List your hobby club's public shows, exhibitions and contests here! There's no charge. Advise "ATH" not less than 90 days in advance. Give telephone of contact man if possible.

Address of contact man is in the same city as site of event unless otherwise specified.

CALIF—Santa Ynez, April 10. First annual F.A.I. team air-model meet by Santa Barbara Modelers. W. J. Kaupp, Jr., 2733 Verde Vista Dr., Santa Barbara.

CALIF—Los Angeles, April 17. All-Calif. free flight air-model meet sponsored by Modelers M.C. and La Balsa Valley JCoFC. D. L. Thompson, 9000 National Blvd.

CALIF—Inglewood, April 17. Skywolves' air-model team races. D. C. Crystal, 805 E. Palmer Ave., Compton.

ALBERTA (Canada)—Calgary, April 19. C.M.A.C. air-model indoor record trials. John Bortnak, 1203 8th Ave., East.

CALIF—Los Angeles, April 22-May 1. 7th Annual California Hobby Show. Model plane flying demonstrations by F.A.S.T. club of model carrier. Fred Tabery, managing director, 3443 S. Hill St.

CALIF—Fresno, April 24. F.G.M.A.C. air-model record trials. Jim Scheidt, 2225 Brown Ave.

CALIF—Chino, April 24. Aya-Toros Convair Recreation Assoc. Olympic air-model contest. Dick Everett, 13265-13th St.

ARIZ—Tucson, May 1. Thermaleers annual air-model roundup. C. R. Downs, 1035 E. 6th St.

ALBERTA (Canada)—Calgary, May 8. C.M.A.C. air-model outdoor record trials. John Bortnak, 1203 8th Ave., East.

CALIF—Santa Ynez, May 8. Third Annual Omnimeet. Santa Barbara Modelers. William J. Knapp, Jr., 2733 Verde Vista, Santa Barbara.

TEXAS—Ft. Worth, May 8. Cowtown Sabhis air-model record trials. Ralph Tenny, 2409 Spiller.

OHIO—Cleveland, May 15. Annual air show at Cleveland Hopkins Airport sponsored by American Steel & Wire Div., U. S. Steel Corp., City Recreation Division and The Press. Control line carrier, stunt and combat. Prizes include pilot training. Charles Tracy, c/o Cleveland Press.

CALIF—San Diego, May 15. Aeroneers annual PAA-Load air-model contest. G. G. Wagner, Sr., 924 Evans Ave., Chula Vista.

FLA—Jacksonville, May 17. Flying Rebels' Dixie States air-model meet at Craig Field. W. J. Cornelius, Jr., 1515 King St.

N.Y.—Brooklyn, May 21. Mirror Model Flying Fair at Floyd Bennett Field. Ted Clodius, N.Y. Daily Mirror, 225 E. 45th St., N.Y.C.

CALIF—Moffett Field N.A.S., May 21-22. California model plane championships sponsored by State Exchange Clubs. H. S. Roberts, Sr., 5610 E. 17th St., Oakland 21.

ALBERTA (Canada)—Calgary, May 22-23. C.M.A.C. 14th annual air-model contest. U-Control and free flight. John Bortnak, 1203 8th Ave., East.

PENNA—Bristol, May 29. Aeromodels 5th Annual Flying Circus. A. L. Abrams, Jr., 1031 Pond St.

CALIF—Fresno, May 29. F.G.M.A.C. air-model record trials. Jim Scheidt, 2225 Brown Ave.

FRANCE (Paris), May 29-30. International championship control line meet (2.5 cc.) for speed models.

ILL—Galesburg, May 30. G.M.A.C. air-model U-Control contest. K. W. Freese, 90 Olive St.

CALIF—Long Beach, July 18-24. National Championship Model Airplane Contest at Los Alamitos Naval Air Station. Academy of Model Aeronautics, 1025 Connecticut Ave., N.W., Washington 6, D.C.

GERMANY (Brunswick), Aug. 27-28. International championship A.2 model glider contest (Swedish Cup).

GERMANY (U.S.A.F. air base), Sept. 3-4. International Wakefield rubber powered and F.A.I. gas powered competitions.

J-C-S Guide

(Continued from page 58)

until December 1952, the records showed such typical—and considerable—job advancement as the following (parentheses contain the type of course studied):

Wilbur Olsen (Aircraft Operations) had as his first position after graduating that of operations attendant at New York International Airport; he became chief aircraft dispatcher at Weir-McCook Municipal Airport in Indianapolis. Albert Anderson (Metal Products Manufacturing) was first employed as a draftsman for Offerman Tool and Die in N.Y.C.; became tool designer for Sperry Gyroscope Co. D. Gilbert Pitcher (Industrial Instrumentation) advanced from technician on nuclear reactor instruments to junior instrument engineer at the Brookhaven National Laboratories. Charles Clinton (Metal Products Manufacturing) first held down a job as draftsman with Republic Aviation. At the end of the four-year period he was drawing a paycheck as Vice President of the Airport Products Engineering Corp., Dover, N. J.

Also interesting was the survey made on the placement of students within six months after graduation, the class quizzed being one that "went into the world" several years ago. Ninety-nine percent of those with jobs were employed

in fields for which they had received training. (Not counting the graduates who entered the Armed Forces, the six who continued their education, and the three housewives, exactly 100% of the students did have jobs six months after diploma time.) What happened to the one student who didn't get work in the field for which he had studied? Well, he took Construction Technology and got a job as mechanical draftsman.

Obviously, employment opportunities were good in all the study fields represented, and a number were in the super class.

Among the job areas wherein the requests for grads far exceeded the supply were Automotive and Diesel Technology, Mechanical Technology, and Radio Communications.

All of which represents just a single typical school that is turning out technicians. Today, the demand for technicians is greater than ever, and increasing.

POSITIONS FOR PHYSICAL THERAPISTS

will be tripled in number by 1960. There is at present a critical need for 3,000 in this job category, and thousands of additional openings will be made when qualified therapists present themselves. Although most physical therapists are women, men are urgently wanted as well. The training consists of a college course in the subject. Starting salaries for graduates are around \$3,600-\$4,000; those with experience may earn \$5,000-\$6,000 per year.

The work has been well described as a combination of science and service, with much attendant personal satisfaction in rehabilitating the sick or injured.

That work consists of using physical means, such as massage, heat, water, electricity and exercise in the therapy or treatment of disease and injury. Graduates may find employment in a number of places—hospitals and clinics (including Army, Navy and Veterans), public health agencies, industrial clinics, curative workshops, educational and research institutions and the like. All treatment is administered under the direction of a qualified physician.

About the college course necessary: the four-year program is a cross between liberal arts and basic medical, with emphasis on subjects bearing on physical therapy.

During the first two years you'll get such general subjects as psychology, physics, chemistry and biology. The last two years will include human anatomy and physiology, with lectures in medicine, surgery, pathology; lab practice with all the physical therapy procedures, and finally full-time supervised experience with actual patients in hospitals.

There are 34 approved colleges with majors in physical therapy. For a free list of these write to the American Physical Therapy Association, 1790 Broadway, New York 19, N. Y. The Association also has available without charge a 16-mm film and a filmstrip on the subject. To learn about scholarships, one of the best plans is to contact the Physical Therapy Director of the school you wish to attend. He would be aware of many sources of financial aid, especially local, not known to the general public. A number of scholarships are open to sons of war veterans. Applications for scholarships should be made early—in September or October of your senior (H.S.) year.

If interested in a career as physical therapist, get together with your high school guidance counselor or science teacher as the friend most likely to get you started. The Association named above will cooperate with that friend in every way it can.

Ceramic Engineer

(Continued from page 35)

meaning its purpose is not immediate industrial application.

The other kind of research, known as applied, aims to get immediate results. This constitutes the greater part of the research done in ceramic plants. It is also known as "development"—improvement in product or process. This may be closely tied in with production, and is a regular part of most ceramic manufacturing. It should be noted that the more important the nature of research work, the more education, often of the postgraduate kind, and experience are required to enter it.

Where will you work—geographically? The majority of the big ceramic plants are located in the States of Ohio, West Virginia, Pennsylvania, New Jersey, New York, Illinois, Texas and California. The chances of employment for the ceramic engineer or technologist are not confined to these States, or to the industries making ceramic products. Other industries like the electrical, chemical and mining are finding increasing use for ceramics graduates. In the metallurgical industries especially they are receiving new welcome. Some intimation of this is contained in a statement by C. F. Hood, president of U. S. Steel:

"... Another phase of steel making [in addition to open hearth and blast furnace operations, where refractory linings and bases in the furnaces are necessary components] in which the special skills of the ceramic engineer are of particular value is in studying the reactions of metals and slags. Such reactions are now of great importance in the making of steel, and will be of even greater importance for newer steel-making methods now being investigated. Ceramic engineers having a good knowledge of physical chemistry and some training in process metallurgy will be particularly useful in this highly technical field..."


All right, let's say you're interested in becoming a ceramic engineer or technologist: what would you study, and where?

There are at present 19 colleges and universities in the country offering majors in this field. The plan of instruction varies somewhat from school to school, but the overall purpose is the same—to prepare the student for work in almost any branch of ceramics. As in all kinds of engineering, a lot of your specific training will come after you start work, and your eventual specialization may depend on your aptitude, ability and the opportunities presented.

Take the case of the mining or removal of ceramic raw materials from the ground. This may involve the open pit or open cut methods, as in the mining of most clays today, or less frequently underground mining where large quantities of rock or other forms of overburden cover the desired material. "In order to properly supervise the manufacturing processes," observes the head of Iowa State College's head of the Ceramic Department, "the ceramic engineer must be familiar with the various mining methods so that he will know if it is profitable to remove some of the less easily reached materials. In fact, some men with ceramic engineering degrees are in charge of the mining operations for the larger ceramic manufacturers."

As at the other schools, instruction in mining is not emphasized in any way at Iowa State, which has one of the oldest departments of ceramics (established 1905). The information on the "winning" of raw materials is merely a phase of

(Continued on page 67)



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7½-in. wing-span, 8½-in. long, ¼-in. scale. Model comes equipped with contrarotating propellers powered with a plastic drive encased in spinner. Many other features such as: pilot and pilot seat, clear canopy, landing gear wheels with movable struts, colorful decals and easy to follow plans. Molded in gleaming metallic silver. Kit No. 526 23 Parts

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A 1965 American Automobile by Hugh J. Baldus of South Bend, Ind. Car is powered by a rear-mounted turbine engine and features all-around independent trailing arm, torsion bar suspension, power steering and brakes. Steering yoke swings to side for easy entry. Top of windshield permits ventilation. Speed 125 mph.



SECOND
\$25
AWARD



Sportscar by DeWitt Thomas of Ashville, N. C. The chassis is basically a 1954 Studebaker with a special Fiberglass or light alloy body. Front grille is a rectangle with a removable screen set inside. Rear bumpers contain exhaust outlets, tail lights and turn signals. Trunk opening controlled by solenoid switch. Plastic removable top.

THIRD
\$10
AWARD



Rear-engine racing car by Richard Arnold of Warner Robins, Ga. Driver's compartment is enclosed. Rear mounting of engine keeps heat and fumes away from cockpit. Car is especially suitable for such prolonged events as the Indianapolis Race where driver is apt to suffer from fatigue and exposure.



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All types are eligible:
restyled passenger cars,
original sport jobs, hot
rods, or military types.

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Cash awards will be made each issue for the three most significant auto designs submitted to this magazine. \$50 will go to the top design, \$25 to the second and \$10 to the third. You may submit sketches for an original design auto, for a restyled car, for sportscar, family sedans, record cars, hot rods, military vehicles or unusual trucks. Include side, front, rear and top drawings, plus sketches of the proposed vehicle from three-quarter front and three-quarter rear positions. Sorry, we cannot enter into any correspondence about this contest. Send entries to Auto Design, c/o Air Trails HOBBIES For Young Men, 304 E. 45th St., New York 17, N. Y.

Ceramic Engineer

(Continued from page 65)

one of the subjects taught, and intended mainly as part of the foundation of understanding the whole field of ceramics. . . . Yet it is possible for a ceramic graduate to work into a specialized mining job.

The schools do, however, emphasize certain broad spheres of activity in ceramic training—preparing their students to become ceramic engineers, ceramic technologists, and glass technologists. The amount and kind of emphasis in regard to these three categories varies, but for present purposes we will pass on to you the program of instruction as observed at the College of Ceramics of Alfred University, a part of the State University of New York. This is one of the two pioneers in ceramic education, founded in 1900.

First, let's look into the course for "ceramic engineer." He's concerned with people and machines in producing ceramic products. He supervises, he has charge of the equipment, he may design and set up new equipment as required; and as mentioned he helps figure out how the product can be manufactured in terms of cost. Mainly, he's a production man, employed at the plants in the actual making of ceramic ware—refractories, insulators, dinnerware or whatnot.

To a lesser extent the ceramic engineer finds work in lab research and development, and in sales. It all depends on what you're best cut out for, and the course for the ceramic engineer prepares you to take on any of these "areas." To make you a potential production man, the engineer's course puts emphasis on math, mechanics, strength of materials, equipment design, and plant layout, for example.

For the first two years of the four-year course you receive a thorough grounding in math, chemistry and physics—the basic sciences of all engineering. The last two years you learn how these subjects apply in an engineering and technical way to the ceramic industries. For instance, the third year you'll take Fuels and Combustion (chemistry), and Strength of Materials (physics). In your last year you'll add to the "ceramic" subjects already covered such new ones as Testing of Products and one on the engineering features of structural planning and design (in regard to ceramic plants). As a frosh, soph and junior you have already delved into ceramics subjects like raw materials, lab work in molds and casts for producing clayware, and learned about glasses, glazes and enamels.

You will, of course, be receiving English courses during the early part of your school career, along with geology and mineralogy, and before you're through you'll have some economics.

"Oke," we can hear our friend Dink saying. "That's the ceramic engineer. But what's this business about 'ceramic technologist'? How is he so different?" Well, he isn't too different. The job of the engineer and the technologist often overlap, and each has to know much about the other's work. "Technology" has been defined as science applied to industry. The "ceramic technologist" is more of a scientist than an engineer. His job has more to do with quality control, and with the technical principles in general behind ceramic manufacture.

As for the training necessary, it's the same as that for the ceramic engineer except that technological subjects are substituted for the engineering ones. At Alfred, the first two years of your col-

(Continued on page 70)

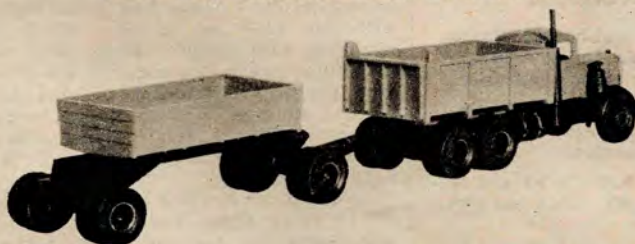
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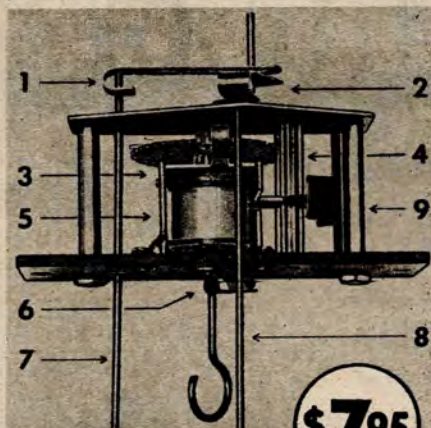
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Under Control

(Continued from page 13)

Another election shows these officers will run the Flying Sparks (Corning, N. Y.) during the 1955 season: Pres.—Pete Bliss; VP—Don Brown; Treas.—Al Parfatti; Sec.—Jim Crump Sr. Pete says it has been too cold for him to have any interest in flying, but Brown, who must be the club Polar Bear, has been out almost every weekend. The group will run their second R/C contest on June 12; site not settled yet, but they hope to get Harris Hill. They also expect to have an inter-club contest with Buffalo Flying Bisons.

R/C films may be had from club mentioned just above; they have 300-ft. reel of color film of local R/C work and would like to exchange films with other R/C outfits. Write to Pete Bliss (47 Corning Blvd., Corning, N. Y.).

Technical Dept. The build-it-big boys are still at it, and some good results have been recorded. Harold deBolt (Williamsville, N. Y.) has had some flights with his 1300 sq. in. job, which is equipped with a Torp .35; he says the first flight was most successful, the plane traveling at about the speed of a LW Cruiser equipped with a single-channel apparatus. Harold feels the answer to a real stunter is a rather slow plane of very light wing loading.

At the other extreme is Ernie Kratzet (1112 Book Bldg., Detroit 26, Mich.) who has a big, hot and heavy biplane stunter under construction. He feels a stunt ship should at least emulate the full-sized planes in performance, and expects to have to "fly" this job every minute it is in the air. The biplane—which is called the ESKimo—will have a Fox .59 engine with Bramco throttle, and is expected to weigh at least 11 lbs. It will be fitted with Bramco 6-reed receiver, and we'll watch with interest to see which of these two schools of stunt theory turns out the best.

Correction, Please. Arnold Reed (80 16th Ave. N., Fargo, N. D.) notes that circuit for the Hamblen 220 mc. receiver shows C9 as .005 mf., and resistor connected to C4 as 47K. Parts list show these parts as .05 mf. and 4700 ohms, and latter two values are the correct ones.

Commercial Products. New address should be noted for Hobby Enterprises. They have moved to larger quarters at 17 Second Ave., Bay Shore, N. Y.

Two items have come to light that will help those experimenters who want to build their own proportional actuators. First is a stock of ready-wound magnet coils that will be fine for units like the Mactuators; they have 13½ ohm resistance, may thus be used without need for rewinding. Available from Gyro Electronics Co. (325 Canal St., New York 13, N. Y.) for 75¢ per pair. Gyro also has coils such as were used in the Mactuators, but these are 300 ohms and must be rewound; 75¢ a pair.

The other actuator part we have located is the disc magnet, which may be had in two sizes from Ronald Eyrich (1091 N. 48th St., Milwaukee 8, Wis.): #917 is 1" x ¼" with a 3/16" hole and costs \$1.75; a larger one, #1053A, measures 1.140 x .40" and has same size center hole. This costs \$2; while pretty large for rudder use, it might be just the thing for a powerful elevator actuator. Both these discs are ground all over and are very heavily magnetized.

New sub-miniature parts that will interest radio controllers are a closed-

circuit jack and two styles of plugs, made by Telex. Former is exact half-size copy of the usual "compact" type of jack made to fit ¼" diameter phone plugs, and it weighs less than .1 oz. Matching plug is also a half-size miniature, has solder lugs; another plug is to same scale, but is of the flat type, and has wires molded-in. These parts not sold direct by Telex. Prices not certain as this was written, but we believe jack will cost 48¢; either type of plug 36¢.

New line of high-frequency transistors has been announced by Raytheon. Their CK760, CK761 and CK762 units are all rated for RF use, the latter being the highest-frequency type of the group. It may prove to be useful for our 27¼ mc. spot, and sells for \$8.70.

Tiny escapement that operates on very low current is the #506 sold by Newz Products Co. (Box 643, Union, N. Y.) for \$7.95. Weighing .56 oz., current drain is about 250 ma. on 1½ V, and unit is rated for use with a loop of ⅜" rubber wound as tightly as you wish. Unique leverage system allows larger than usual movement of the catch arms, making it possible to have considerable overlap between these arms and the ends of the rotor. Unit is of the two-arm self-neutralizing type, comes packed in protective plastic case. Concern will announce other escapement models soon.

A self-contained 6 V power supply is being marketed by Electronics Specialties Supply Co. (58 Walker St., New York 13, N. Y.). For a 465 mc. transmitter the supply puts out the necessary 135 V, and 6 V for tube heater; can also be used in transmitters with battery tubes, with dropping resistor for 1½ V filament. Power comes from an NT16 storage battery, and battery and power supply both fit in the space required for the normal dry battery complement of the transmitter. Power supply sells for \$9.95 in kit form and \$12.95 ready to use. NT-6 batteries (these are said to have much better life than the usual run of NT-6's that have been on the surplus market) cost \$2.95 each.

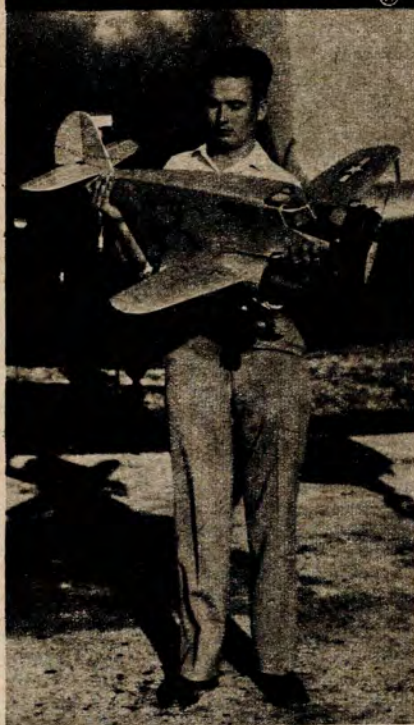
Nickel-cadmium storage cells that should have many uses in R/C are being made by Sonotone Corp. (Elmsford, N. Y.). Made in a very wide range of sizes; the ones useful to R/Cers are the 1-H-10, 2-H-10 and 3-H-10, which are rated at 1, 2 and 3 amp-hours respectively. The 1-AH unit weighs about 2 oz. and measures 2¼" high x 1 5/32" x 11/16"; 2 AH job is about twice as high and weighs a bit over 4 oz., while 3 AH cell weighs 6 oz. Prices for the three sizes are \$8, \$11 and \$13. These cells have exceptionally long life, may be charged or discharged at practically any rate you want, may be left charged or discharged for any length of time without harm. In short, they are very difficult to damage; thus, though first cost is rather high, cells should give years of service. Cells produce about 1.3 V each and are housed in clear plastic containers.

A new plane kit designed especially for R/C use will be the "Mambo," kit No. FS-3 by Sterling Models (Phila. 22, Pa.). Will have 48" span, and is intended as a "trainer"; designed for easy building, prototype plane has been flying in Philly area since early summer of 1954.

Offered on an experimental basis for the present, a new style of Compound escapement has been developed by Bonner Specialties (2900 Tilden Ave., Los Angeles 64, Calif.). Known as the "180 degrees, quick-blink" unit, and sells at same price as the regular Bonner Compound—\$14.95. The new one has the two rudder positions at exactly 90 degrees each side of neutral. Motor con-

(Continued on page 77)

"My Favorite Model"®



"Twin engine Cessna", says Morris of San Antonio

"The model of World War II Cessna UC-78 or AT-17 was built in 1945 at Roswell, N. M., by Johnny Fulton, now of Sacramento, Calif., and myself. It was our first attempt at twin-engine construction. We were both Air Force pilots and had flown the UC during our flight training, so it was only natural to choose this airplane for our experiment. The model has a wingspan of 46 in. with detachable outer panels, leaving a 19 in. center section. Two O&R 23's originally powered the ship, but many other combinations of engines have been used such as 29's, 45's and 60's, both ignition and glow-plug, occasionally with 23's on one side and either 29's or 45's on the other. Some ignition engines were equipped with speed control. Once, when two 60's were used, the right engine fell out, but flying was continued with a pair of pliers in the empty nacelle balancing the ship. The UC-78 would also fly quite well with the right wing panel removed. It is virtually impossible to estimate the number of flights on this model—25 or 30 during one afternoon's session was not unusual. Several pairs of wheels and many engine mounts have been worn out on this job. The old bird was retired about two years ago as it was about to fall apart. It hangs now in a downtown San Antonio hobby shop. I have built several twin-engine models since, but none could match the record of this one."

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Ceramic Engineer

(Continued from page 67)

lege career are identical with those for ceramic engineering, meaning you can wait till your junior year before deciding which of the two courses to specialize in. After your second year you study more science as it applies to the ceramic industry, and also specialized ceramic courses.

We come finally to the "glass technologist," a fellow who's different because glass is different.

Applied to ceramic ware it plays the role of glaze, and applied to metal it is porcelain enamel—for these are really glass coatings. Also, it acts as a bond in the making of pottery, to add strength to the clay. We have already mentioned the wondrous properties of glass, such as its potential strength, through special tempering, of 50,000 pounds per square inch. Is it any surprise, then, that a special technologist in glass is needed to get the best out of such a talented and challenging substance?

In production, let's say, the glass technologist has to make sure that the amount and proportions of ingredients are correct, that the temperatures for melting are properly regulated, that the annealing or cooling is done with the right gradations.

But these fundamental steps are only part of the job. The glass technologist has to watch for and prevent such defects as bubbles, crazing, blisters, slag spots, strain, waves, fish scales, streak, corrosion, pinholes, etc.; and he is charged with keeping the color from varying from one batch of glass to another. All these possible defects in glass manufacture can be serious—in some plants the loss due to them runs as high as 20%.

At Alfred, as elsewhere, students in glass technology who show the necessary promise are encouraged toward taking graduate study, as a requisite for advanced research work—which is where the greatest challenge of all comes in. (Corning, for instance, has 50,000 formulas on file in its research lab. Making 37,000 different products today, the company estimates that 75% of its business derives from the sale of products which weren't even in existence 15 years ago. Research had much to do with that fact.)

The first year of glass technology at Alfred is identical with that for ceramic engineering. Thus, you may wait until your second year before deciding whether you want to be a glass man.

Warning: don't get the idea that these various branches of study have walls around them, either of clay or glass. No matter what you decide to specialize in, you'll receive a fundamental knowledge of all phases of ceramics.

By the way, Dink, you might pass on the word to the boys down at the Chocolate Shop that ceramic students may become members of Keramos, the national honorary ceramic engineering fraternity. (And in case they quip that it's all Greek to them, just jab back with the fact that the Greek word "Keramos" means "fired stuff" or "fired earth," and that's where the English word "ceramics" comes from.)

Now for the list of colleges and universities offering courses in ceramic engineering and technology, based on a report prepared by the American Ceramic Society. Write to these schools for catalogs and information, directing your letter to the Department of Ceramics in each case. The address of the school is given in the parentheses, along with the name of the head of the department:

University of Alabama (University, Ala.; Dr. T. N. McVay). University of California (Berkeley, Calif.; Dr. Joseph A. Pask). University of California, Southern Branch (Los Angeles 24, Calif.; Dr. William J. Knapp). Clemson Agricultural College (Clemson, S. C.; Prof. Gilbert C. Robinson). Georgia Institute of Technology (Atlanta, Ga.; Dr. Lane Mitchell). University of Illinois (Urbana, Ill.; Dr. A. I. Andrews). Iowa State College (Ames, Iowa; Prof. C. M. Dodd). Massachusetts Institute of Technology (Cambridge 39, Mass.; Dr. F. H. Norton). Missouri School of Mines & Metallurgy (Rolla, Mo.; Dr. Paul G. Herold). New York State College of Ceramics (Alfred, N. Y.; Dr. John F. McMahon). University of North Carolina, Raleigh Unit (Raleigh, N. C.; Dr. W. W. Kriezel). Ohio State University (Columbus 10, Ohio; Prof. John L. Carruthers). Pennsylvania State University (State College, Pa.; Prof. Floyd A. Hummel). Rutgers University (New Brunswick, N. J.; Dr. John H. Koenig). University of Texas (Austin, Tex.; Dr. Robert L. Stone). University of Utah (Salt Lake City, Utah; Prof. P. J. Christensen). Virginia Polytechnic Institute (Blacksburg, Va.; Dr. Paul S. Dear). University of Washington (Seattle, Wash.; Dr. James I. Mueller). University of West Virginia (Morgantown, West Va.; Dr. W. A. Koehler).

Note: At Massachusetts Institute of Technology and University of California at Berkeley, only graduate study is offered in ceramics.

As already stated, "ceramic design" is a field of its own, being connected with art rather than engineering. As the term implies, the ceramic designer creates shapes and forms in ceramic products; he deals also in colors, choosing the ones suitable for particular items of manufacture, develops new colors, and is concerned with "quality control" in decoration. Among the schools in the foregoing list, several offer degrees in ceramic design or art as well as majors in engineering and technology. Notable among these is the New York State College of Ceramics at Alfred.

Here the student must decide whether he wants to study ceramic designing right from the start, for the curriculum is different from the very beginning. At Alfred, the first two years cover creative design in general—drawing, color, modeling and the like. In your junior year you really begin to specialize in ceramics, working in pottery shops and labs, learning about glazes and clays and how they perform, and about processes and materials and their relation to production.

Other schools on the list which offer courses in ceramic art as well as engineering are University of California at Berkeley, University of Texas, and University of Washington. In addition, approximately 18 colleges and universities have courses in ceramic art, though not in engineering or technology.

Incidentally, it might be mentioned that around 300 schools in the United States offer some kind of advance work in training students for the manufacture of hobby articles or gift type merchandise in the ceramic field. However, college degrees in ceramic engineering are given only by the institutions of higher learning as already listed.

There are various scholarships open to high school students who wish to major in a college ceramic course, with more being planned. Some schools have scholarships for students already embarked on such a course, and quite a few fellowships are available to graduates interested in further study. For the last several years the University of Washington has awarded two scholarships to high school seniors, each worth \$1400 for the four-year course, and sponsored by Gladding, McBean & Co., a West Coast ceramic manufacturer. North Carolina State also has been offering two scholarships, donated by Brick and Tile Service, Inc., to high school seniors, each with a value of \$500 per year for four years. At Ohio State, the Ohio Ceramic Industries Association has made available \$300 scholarships at the end of the year to outstanding freshmen desiring to

(Continued on page 80)

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42" EXPRESS CRUISER**

Designed for power operation or on the shelf. Finished parts for quick easy assembly.

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Secrets: Boat Finishing

(Continued from page 49)

protection against spilled boiler water and fuel. The interior should be preferably fuel proofed inasmuch as the fuel most used in model boilers is alcohol. In view of the fact that steam engines are not as messy as internal combustion types the probability of splashing fuel onto the deck and hull is considerably less. Therefore, the steam powered boat need not necessarily possess a fuel proof finish on its exterior.

The heat created by the boilers of steam powerplants can have a detrimental effect upon the finish of a boat model superstructure as well as the hull if this heat is not directed to the atmosphere as quickly as possible. Although the temperatures of the boiler gas exhaust are not high enough to burn the hand they can wreak havoc with hull interiors. This heat is usually moist because of the fact that most small steam engines exhaust the steam vapors into the hull and not to the atmosphere. The moist, warm gas will soak into the structure and eventually cause twisting, swelling and warping which ruin the paint job no matter how good it is. This can be prevented by the installation of a thin sheet metal uptake casing which will direct the hot moisture up through the smokestack where it belongs.

Electric motors need no special finish whatever in view of their clean operation.

And so, then, we have found that the methods in use to produce good finishes vary considerably. Despite the fact that the "died in the wool" model boat enthusiast still adheres to oil paints and

varnishes the trend is toward the increasing use of the quick-drying lacquer type finishes such as the dope used by model airplane enthusiasts. The fuel proof qualities of many of these products makes it mandatory to use them on many operating models.

It has been found that the majority of oil paints can be applied as a finish coat over a lacquer-type sealer such as Testors, Aero Gloss or Aristocraft without any harmful reaction. On the other hand there are times when airplane dope has bubbled and cracked when applied over sealers other than the type of dope being used. No matter what product is used to finish your handicraft the important thing is to be patient and carefully apply the sealer until a good base is obtained before any color is added. Remember the finish can "make or break" the model that took many hours to construct for "it's the finish that counts."

Forster "99"

(Continued from page 56)

actuated by a cam on the crankshaft. One set is for high speed and the other for low speed operation. Thus by switching the current from one contact to the other, the engine responds to the predetermined spark setting, ranging from full speed to idling speed. This change may be accomplished instantaneously.

The method of fuel transfer differs from the rotary valve system used today in most high-speed model engines. In the rotary valve systems, the fuel en-

(Continued on page 73)

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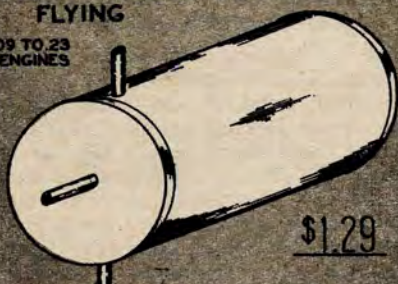


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THE READERS WRITE

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No Space for Spacemen? . . . Your Aircraft Design Competition used to be called "Airmen of Vision," yet some of your prize winning designs show about as much vision as a bat. For instance, take a look at the third prize winner in the July 1954 edition. As far as I know, there is no such thing as "ozone" gas. The side view shows no airfoil at all on this monstrosity's wings, if they can be called wings. I cannot see how it could ever rise high enough to crash, never mind reach 2200 mph. However, provided it would, no flame thrower or "fire stream" would ever work in such a slipstream. As anyone can see, such an aircraft could never exist.

There have been many other designs such as this submitted, such as an aircraft powered by a repulse ray. The designer did not include any information as to just what this is. It is clearly a mere figment of the imagination, and belongs in a "Buck Rogers" or "Space Patrol" comic book. I would very much like to see logical, possible designs winning this contest.

Stephen Krasnor, age 12, Belmont, Mass.

Our 1954/55 Air Progress Annual . . . The article, "The Incredible Aircraft of the German Luftwaffe," created a sensation with the aerobugs here in Japan. I also think it's terrific. Just fabulous.

Shozo Abe, Himeji, Hyogo, Japan

. . . I am twelve years of age and in the seventh grade at Washington Jr. High School in Pontiac. I think "Air Progress" is without a doubt the finest aviation magazine there is. There should be, however, less drawings and more photographs whenever possible.

Jerry Cunningham, Pontiac, Mich.

Their Rocket Rose 4,500 Ft. . . . The members of our society were very pleased with your article "Rocket Trails" in the Feb. issue. Our society is new, and just getting under way. We are amateur rocketeers. Our test area is a two-mile-square field on which our small block house is built. Our rockets are made in the city in our private laboratory. Our last test firing was on Dec. 2, 1954. It was a 4 ft. single-stage rocket which traveled to the height of 4,500 ft. The society's project for 1955 is a 12-ft. liquid-fuel rocket. We will send you photographs and results of this firing.

Edward G. Anderson, Pres., Wayne Rocket Society, Detroit, Mich.

There's Money in Dreams . . . I was very much thrilled with the articles about historical guns in recent issues of your magazine. I think this is a great idea and hope that it is not discontinued. I also think that the auto, boat and plane designing contests are a great idea. They give boys an opportunity to try their hand at designing their future dream cars and the like and have fun while doing it. I have designed my first car for competition!

Gabe Kingsley, St. Louis, Mo.

Modeling Ma . . . Has Dallas Sherman heard from anybody claiming that trophy you described in the Dope Can of the Sept. 1953 issue of Air Trails? I like your magazine very much. I think it's tops. My mother gets it and won't let me have it till she's done with it.

Michael E. Crist, Cheboygan, Mich.

• No one has yet turned up to claim Mr. Sherman's ancient trophy.

Real Gone Pair . . . On our fifth (approximately) reading through the new A.T.H. (March '55), we ran across the section on questions and answers dealing with engine bugs. In the letter written by J. R. Johnson concerning the uneven firing of cylinders in his Viking '65', you made a boo-boo in your answer. Prop, shmop! I have a Viking '65' and had the same trouble. Tonight we started looking and the trouble is absurdly simple! The intake dumps into the crankcase right in front of the rear cylinder. With the exhaust ports facing the mounting lugs, this causes the rear rod to effectively supercharge the rear cylinder by picking up the fuel from the opening in the crank and slamming it into the intake bypass. Turn them cylinders

over, Bwah! Wow! Will you be surprised at the difference! We were in so much of a rush to test our theory that we went down to the Industrial Arts Lab (I am a major at Florida State Univ.) at 10:00 p.m. to try it out. We hope we don't get a report from the neighbors.

Another thing we're planning with this same engine is to raise the compression and open all ports, especially the intake venturi (this is a venturi?). It does about 6,000 rpm on a 14d. x 8p. Flo-Torque prop cut about an inch and a half. An 11 x 6 should give best performance. Thin paper gaskets should also be cut and placed between the cylinders and the crankcase, and between the rear crankcase cover and the crankcase.

We are running mine on two Champion VG-1 glow plugs, but a better deal is to get two aluminum plug adapters for the old engines, and use VG-2 plugs. This necessitates removing the brass plugs already in the head. Be careful! If you strip those heads, you're hurting!

Right now we are finishing up our Mac II transmitter and power supply. When it's done we'll send in pictures and some data. We are in league with Jimmy Gibson, president of the Tallahassee Prop Busters, who is now finishing a Royal Rudder Bug with Lorenz two-tuber and proportional actuator (Adams). I am on the road to finishing a modified Bootstraps with a Lorenz T-T and Bonner miniature, powered by a McCoy .09 glow.

We have been digging through a lot of old war surplus stuff here at school, and boy! can you find some goodies in it! We have too many things to write about, but to mention a couple, earphone magnets can be used to make miniature escape-ments, certain very hardy relays can be found and modified by replacing their 54 coils with Sigma coils for transmitter relays (too heavy for all but huge planes). The springs must be replaced with finer springs.

Well, we hope we have passed on a few choice words of wisdom to someone somewhere. The more we learn, the more we realize there is to learn. We are, a couple of intrepid geni!

Dave McCommon and Alan Harkness, Fla. State Univ., Tallahassee, Fla.

P.S. We are overjoyed at your new coverage of radio control. As for the other subjects, we guess somebody likes them.

P.P.S. Please send collect the issue in which the Mac II transmitter is featured.

• Thanks for the semi-kind words, fellows. Details on the Mac II transmitter were reprinted in "Group 554A" by Hobby Helpers, 770 Hunts Point Avenue, New York 59, N. Y., price 35¢.

Club News? Good! . . . I would like to take this opportunity to personally thank you for the recognition given our club. While still a young organization, we are trying to grow into a well represented club including all phases of model aviation. Your "Hobby Model World" section is greatly enjoyed by all the members of our club and we hope, in the future, to provide you with news of ourselves, also pictures.

Cordell Combs, Milan, Mich.

From the Executive Offices . . . Thank you for my copy of the beautiful 1955 Model Annual. I think this is the best issue of this publication I have yet seen. I like particularly the features on full scale three-view engine drawings and on the directory of model clubs. Such features are extremely useful for persons seriously concerned with model airplane activities.

We wish to thank you once again for the generous space and attitude toward our PAA-LOAD activities. The kind words mentioned about George Gardner are certainly deserved because our program could not have developed without his devoted personal enthusiasm.

Dallas B. Sherman, Asst. to Admin. V.P., Pan American World Airways System, New York, N. Y.

Radio Op . . . Let's have more about radio. I am hoping to become a "ham" very soon, and would like to see some radio articles in ATH/FYM.

Gail Spittler, Detroit, Mich.

Forster "99"

(Continued from page 71)

ters the crankcase through a rotating slot either in a hollow crankshaft or in a disc located within the crankcase and driven by the crankpin.

The Forster .99 employs a straight intake system which in essence works as follows. The unrestricted die-cast venturi air intake tube is located at the rear of the cylinder just below the level of the exhaust ports. As the piston starts its upward travel, air is sucked in through the intake tube drawing a predetermined amount of fuel from the needle valve along with it. This mixture enters the cylinder below the piston, which in its upward travel has opened the intake ports. On the downstroke the piston compresses this mixture and forces it upward into the hollow cavity of the piston. The mixture then escapes from within the piston through a square port which opens into the transfer port, sometimes referred to as the bypass.

The mixture next travels up the transfer, bypassing the piston, and reenters the cylinder above the piston. As the piston travels upward it closes the transfer port and compresses the mixture so that it may be burned by the firing of the spark plug. However, just before the piston reaches the top of its travel, the intake ports are opened and the entire cycle is repeated. (Since the exhaust cycle is the same on all two-cycle engines, this phase of the firing cycle was purposely omitted here in order to clarify the intake system.) This system has proved quite satisfactory on low and moderate speed long-stroke engines where power rather than speed is the important factor.

The straight intake system is seldom if ever used on glow plug or diesel engines since it allows an engine to run in either direction, clockwise or counter-clockwise. Not a bad feature in itself except that it can result in no end of trouble should the engine backfire and run backwards after the model is airborne. But this cannot happen with the .99 using its ignition system which is set up for counter-clockwise running only. From the foregoing it should be apparent why we do not recommend converting the .99 to a glow plug operation. We've had queries about this.

Tests were conducted with two propellers. After sufficient break-in time and with the engine leaned out for maximum speed, the following rpms were recorded. With a 14/6 medium blade propeller, 5700 rpm high speed, 3500 rpm low speed. With a 15/3 medium blade propeller, 6200 rpm high speed, 3800 rpm low speed.

The model .99 engine—because its maximum power is developed at medium high speed—is exceptionally well suited for powering larger radio-controlled models. Its speed is easily controllable. Running on a mixture of gasoline and oil, it is less prone to speed variations due to changes in climatic conditions. It is easy starting and from all indications reliable and capable of an extremely long life if given reasonable care.

Specifications: Bore—1.0625". Stroke—1.125". Disp. .99 cu. in. Compression—8:1. Weight—14 oz.



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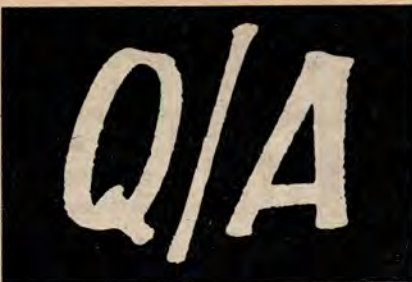
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What's your question? You ask 'em and ATH's Experts Advisory Board will do its best to supply the answers

Formula for Drone Fuel . . . Since Drone Engineering Co. went out of business I have been unable to obtain Drone diesel fuel. Have tried several other fuels but have not found one that would operate my "1949" Drone satisfactorily. Would you please send me one or more diesel formulas that would work well and also properly protect my engine from wear?

Joseph Marshall, Merchantville, N. J.

● Commercial Drone fuel was made up of two parts ether and one part #20 motor oil. These proportions may be varied from two to one (2-1) up to three to one (3-1) and still give satisfactory performance. More ether can be used in a tight engine but more oil may be required in an old one. Do not use oil heavier than #30 or it will collect in the head and cause difficulty in starting.

Ether is hard to obtain at a reasonable price. Your best bet is to look for someone connected with a commercial solvent company who might get it for you at a commercial price.

XF10F Jaguar . . . I would like to know what happened to the XF10F Jaguar. Did it make its initial flight yet?

S/Sgt. Thomas J. Cleggy,
Sheppard AFB, Tex.

● The Grumman XF10F made a number of test flights at Edwards AFB, Muroc, Calif. However, Grumman and the U.S. Navy decided not to go into production on the airplane.

Tone Equipment . . . Here is the big question. I am not a "Ham," therefore would have to rely on a commercial outfit like the "Citizens Band" where you can buy your xmtr but may build the receiver. A friend who is a radio man at the base says that the four circuits I have in mind could be operated on the frequency of 465 kc with 4 different tone circuits. Is this possible, and if so can the Citizens xmtr be tinkered with at all to modify the tone circuits into it? If not, is there any way I can do what I want without a license? What is your opinion of speed control of a Dyna-Jet, or to dampen downthrust for taxiing?

Randolph R. Smith, Big Springs, Tex.

● The Citizens 465 transmitter cannot be legally changed to tone operation. However, you can use tone on 27 1/4 mc. Citizens R/C frequency, and can build your own apparatus for this spot. Rockwood, P. O. Box 762, Walnut Creek, Calif., sells 5 channel tone equipment. Folk's, 314 Fifth Ave., New York 1, New York, have 3 channel outfit of same type.

For operation on 27 1/4, a simple license form is needed. There is no examination and no cost.

So far as we know, Dyna-Jet is pretty much a one-power engine. Suggest you write maker for ideas on changing thrust in flight. It might be possible with a variable needle valve. Manufacturer is the Dyna Products Division of Curtis Automotive Devices, Inc., Box 232, Bedford, Ind.

Model Pontoon Kits . . . Throughout the past year we have had many inquiries as to where pontoons or plans for same may be obtained. Will you come to our rescue and suggest a source of supply? Incidentally, we have twice increased our order for your swell magazine. It's a sell-out every month.

Allan Germaine, Academy Supplies Ltd.,
Toronto, Can.

● For model pontoon kits contact Berkeley Model Supplies, West Hempstead, N. Y., and Consolidated Model Engineering Co., 3087 Third Ave., New York 51, N. Y.

Wildcat and Zero . . . I have read many times of the Grumman F-4F Wildcat. I would like to know its armament and top speed. I also would like to know the top speed of the Jap Zero.

Gary Miller, Dayton, Ohio

● The armament of the Grumman F4F-3 Wildcat consisted of two caliber .50 machine guns. Top speed was 320 mph at 18,800 ft. The late model Zero, known as Zeke 52, had a top speed of 355 mph at 20,000 ft.

Diamond Fuselage . . . Could you tell me how the diamond fuselage stacks up against the box and round fuselages for a contest model?

Scott Norman, Chicago, Ill.

● The diamond fuselage has become increasingly popular due mainly to its very clean lines, clean fuselage to wing mounting and its ease of construction. It has an aerodynamic efficiency which stacks up better than the box fuse and almost as good as the round fuselage. The round fuselage loses out due to the nature of construction time and weight, while the box gains from its ease of wing mount. The diamond also allows a very good adaption of return gears which so many fellows are now using.

Venetian Blind . . . In a past edition of Air Progress, Horatio Phillips' Venetian Blind craft of 1893 is diagrammed. If you have any further information on this I would appreciate it.

Lisa Volow, Kings Park, N. Y.

● Sorry, we have very little information on Horatio Phillips' Venetian Blind airplane. Craft illustrated in our 1952 issue of Air Progress was a steam-powered model which ran on a circular track. Later Phillips built a full-size machine powered by a gasoline engine, but whether it flew or not we do not know.

Half-A's on Long Lines . . . How in the world can I get a Half-A job out of my back pocket when I use long lines? I use nylon thread and plenty of offset but when lines exceed about 18 feet I start jumpin' rope.

Clyde Knauent, Saugerties, N. Y.

● Small light models are all difficult to manage on long lines. If there is any amount of wind blowing, the small model simply does not have the power and mass to bore through the wind. Line drag is an important factor also. Solution—build bigger models or use more power on present ships. Check balance carefully, balance farther ahead on wing than 1/4 chord.

On 27 mc. Transmitter . . . You give the circuit diagram for 27 mc. transmitter. Could you tell me how far apart to put the turns on the grid coil? In adjusting the frequency, must the grid coil be varied as well as the tank coil? Can a 14' 5" folded dipole antenna be used? If so, how many turns should be used to link it with the tank coil?

Stuart Culp, Bethany, Mo.

● Wind the turns on the grid without space between turns. No adjustment is needed in the grid or tank coil. A dipole could be used. It has not been tried here, since most users prefer vertical antenna, due to convenient size.

German "Mystery" Planes . . . I just finished reading your Air Progress for 1954-55. It's the best publication I have bought, since the last one, on military aviation this year. The only thing wrong with it is it should come out every month. I especially enjoyed the article and illustrations on "The Incredible Aircraft of the German Luftwaffe," by Heumann and Grosz. Being a student of German aviation since I came out of service in 1948, I haven't found too much reference material. Would it be possible to obtain photographs of some of the planes illustrated? There was no caption for the picture of rocket aircraft and guided missiles. I was wondering what models they were. Some I know, but others I've never seen before.

I also enjoyed the article in the Air Trails Pictorial of Nov. 1945. I kind of wondered about the article, though. So the EF-126 is the same as the Fi 103/R3 (Air Progress)? I would also like to know who was building or planning the EF-128 and Fernbomber 1107/II? I have never run across any more information concerning these aircraft or the Horten 18.

I also enjoyed the article in the October 1952 Air Trails on the de Schelde (Fw 198) S.21. I had been trying to obtain a photo of it till I bought that issue. Everybody I wrote to said the plane existed but no photos (except drawings) were available. Congratulations on an excellent magazine and the article on the Luftwaffe. I hope you run future articles and photos concerning it.

Werner Ernst, Davenport, Iowa

● We do not know exactly where you can obtain photographs of the German warplanes, but suggest that you contact the various photo services that advertise in Air Trails Hobbies for Young Men and Air Progress.

These services also may steer you toward books on the Luftwaffe. Some were published in England.

The EF 126 featured in the November 1945 issue of Air Trails is different from the Fi 103/R3. The EF 126 was designed by Junkers and, as far as we know, never produced, while the Fi 103 was in actual production and a number of German pilots were trained on its two-place version. The EF 128, also a Junkers design, was still only a project when the war ended. It was a pterodactyl midwing two-place night fighter equipped with radar and powered by a rocket engine. The Horten Ho 18 was another project that never materialized. Sorry, but we have no information on the long-range (Fernbomber) 1107/II, but the designation puts it in experimental stage; undoubtedly, like the EF 128 and a number of others, it never left the drawing board stage.

Dirt in Tank . . . I have a motor that will start but it won't keep on running. It will run for a while very fast and then cut out. Will you please tell me what is the matter? I have taken very good care of this engine.

Warren Zaeske, Leonard, N. D.

● Your trouble sounds like dirt in the fuel tank or in the fuel line near the needle valve. The engine can be started and get enough fuel to run for a while, then the dirt is sucked into the fuel line or valve and blocks off the flow of fuel, causing the engine to turn lean and give a burst of speed and finally stop. To remedy this condition, remove the needle valve and disconnect the fuel line from the tank. Pump fuel through the needle valve housing in both directions to wash out dirt. If trouble still exists you must have dirt in the tank. This condition could be proven by running your engine on another fuel tank.

Cleaning a tank is sometimes difficult. It can be best accomplished by filling the tank half full of alcohol or a thin fuel mixture. Attach a long piece of Neoprene tubing to the engine suction line and turn the tank so that one of the vents is in the bottom of the tank, then close the opposite vent with one finger, check the tank and at the same time blow through the tube. This agitates the dirt and forces it out with the alcohol.

Small engines often give trouble when they sit for a week or more because heavy oil in the fuel collects in the needle valve. Whenever you take your ship to the flying field, start out by filling the tank, then block the open vent and pump more fuel into the tank until one-half teaspoonful runs out through the needle valve. This washes out heavy oil and the engine will start easy because it can get fuel without difficulty.

Douglas XB-19 . . . I would like to know what happened to the Douglas XB-19 heavy bomber? I saw a picture of it once in a Military Intelligence aircraft identification book dated February 21, 1942, and I haven't heard of them since.

Jimmy Phillips, Avondale Estates, Ga.

● The XB-19, having served as an experimental bomber for the development of our large bombers, was scrapped immediately after the war.

Supercharged Thunderbird . . . I recently acquired a model engine by the name of Supercharged Thunderbird. The only information I have on it is the fact it was manufactured in Phoenix, Ariz., manufacturer's name and address unknown as yet. As it seems to be a good engine, I would like to find out all I can about it.

Nelson L. Bell, Fayetteville, Ark.

● The Supercharged Thunderbird was manufactured only for a short time after World War II. As far as can be determined the company is out of business now. We do not know of any present address.

The Thunderbird displacement is .645 cu. in., which puts it in Class D. Correct fuel is not known, but since it is a ring engine we recommend 2 to 1, or 3 to 1, gas-oil mixture for ignition operation. Any standard 3-volt ignition coil and condenser should be used. Compression ratio is given at 6 to 1 which means that it is low for glow plug operation.

Jane's Yearbook . . . I am interested in ordering the book, Jane's "All the World's Aircraft," for our school library. I do not know the publisher but I am hoping you can tell me.

Virginia Ford, Dana, Ind.

● Jane's "All the World's Aircraft" is published in the United States by McGraw Hill Book Co., 330 West 42nd St., New York 36, N. Y. The price is around \$22.



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Model Car News

(Continued from page 8)

these days! Franny says the Swiss model racers are going hotter all the time and it wouldn't surprise him a bit if some of the World Speed records are knocked down by these fellows in 1955.

Incidentally, in Europe there is just one class of racing cars—no Custom Sportsman, Custom Proto and so on that we have here; just the "Speed Class." They do have engine classes, though, and speeds are about like this: .09 class—75 mph; .15—88 mph; .030—101; .61—132 mph. Latter record was made by Joe Shelton from the U.S. Franny says the European racers can't understand how we get such high speeds over here, and opines that our tracks must be better.

AMRCA elections for 1955 are over, and following men were voted in: Pres.—Doc Cronin (Hartford City, Ind.); V.P.—Bill Wunderlich (New Orleans); Sec.—Treas.—Carl Noward (Toledo, O.). Bill Bissman was selected top Model Race Car Operator for 1954; this idea of selecting the top man for the year proved popular, and twelve racers were up for selection. Good sportsmanship counted just as much as winning speeds, but at that the voting was very close—in fact Bill won by only a single vote! Secretary Noward tells us that 1954 was a banner year for model racing, with many of the older fellows getting back into the game; also, some of these boys found they could have a lot of fun with the older cars, at a very moderate cost. The new World Record in Custom Sportsman Cars made by Jack Oliver of Akron (134.77 mph) did a lot to stimulate activity in these "poor man's classes."

Many new track records were set up, with Carl Franz of Lafayette, Ind. at the top in this respect. Bill Bissman made three track records himself, while "rookie of the year" was undoubtedly Dan Clark (Akron), who collected seven certificates. West Coaster Ed Bayne looks like a good candidate for 1955 Model Car Operator. The AMRCA appeals to all owners who have cars that they are no longer using to get in touch with headquarters; lots of fellows want to get cars but can't locate them, and these unused cars can be kept in action via the AMRCA.

Interesting car news comes once again from Bob More (66 W. Elizabeth Ave., Bethlehem, Pa.). Says he visited Bob (150 mph) Loose recently and saw what may well be the hottest car for 1955; it's a Custom Proto and from the outside looks quite similar to most others in this category—but there the similarity ends. The pan is wider and huskier to give more mounting rigidity and weight for better traction. Important departure is the mounting of the magneto on the gear box, instead of on the engine front end; it is hoped that this will eliminate vibration and binding of the front crankshaft bearing—resulting in more power to the wheels. Brother Loose also told Bob of a car being built for him by Arne Zetterstrom of Sweden; Arne even cuts his own gears, and holds one of the European records of 135 mph.

Bob was ready to call it a night and leave, when Loose pulled out another new one—really radical job. It resembles the Kenz-Leslie Bonneville Streamliner that cleaned up at the Hot Rod races for several recent years (at speeds of 250 mph plus). Loose figures it is worthwhile to try and cut drag by enclosing the wheels; as Bob More points out, there will also be ample room to install tank, magneto, etc.

Commercial Topics. This hot engine business gets more complex all the time! Last month we noted that one specialist in the fast car field had heard from Dooling Bros. that they couldn't possibly build any engines at this time. Now comes a note from another model race car authority who ought to know, that Dooling will build engines! Leaves us sort of dizzy. On top of this is a rumor that a close copy of the Dooling .61 will be put on the market soon. Engine is supposed to have a price between \$30-40, and performance is said to be good. Hope to have more news of this for our readers soon, as it should interest the boat boys too.

A whole line of scale kits of foreign sports and race cars is to be had from Autokits (2708-R Magnolia Blvd., Burbank, Calif.). They are to scale of 3/4"=1', cover such makes as Mercedes-Benz, Jaguar, Bugatti, E.R.A., and so on, and kits cost \$3.50; electric motorizing kit for any type costs \$4. Concern also has plans in 3/4"=1' scale of many of the same cars, selling at \$1.50 per set. They also carry many hard-to-get books on model scale car construction.

A few "1234" cars are being made by Carl Noward (1384 Berdan Ave., Toledo, Ohio), but not enough to fill the demand. Carl says he is willing to sell some of the parts, for those who want to make up their own; he can furnish castings milled for gear boxes and motors, but mags are very scarce. He also has top-grade fuel shut-off valves, and quite a stock of used cars of all types.

Build the Chance Vought OS2U-1 "Kingfisher"

(Continued from page 43)

Rear portion of landing gear must hang down until bottom of body is planked, and is then forced into wood and glued.

Mount engine and tank and finish planking body. Aero Gloss Plastic Balsa may be used to fill cracks, to mold fillets, and around tail cone where necessary. Sand well.

Mount rudder securely and re-cement to make a strong rudder body connection. Bend tail wheel strut from 1/16" and force into position where shown on plan. Cement well.

Apply several coats of sanding sealer, sanding between coats. When satisfied with finish, brush on several thin coats of fuel-proof dope.

Chance Vought indicated on their factory plans that this particular model could correctly be colored battleship gray, with trim colors as indicated on construction drawing.

Compound and rub down model for smooth finish. Final details include old star insignia, wing walk, antenna, canopy, lettering, etc. Thin strips of painted masking tape can be used to trim the canopy. After last finishing touches are on, wax and polish. Try Aero Gloss or equivalent products for slick finish.

Next issue!

Mac-III "AES"

Three-tube

R/C Receiver

By H. G. McEntee

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ESSCO's complete line of R/C materials is all of BLUE RIBBON QUALITY. Be convinced, don't take chances with your costly models to save a few cents by using "inferior bargain" junk R/C parts. SAFE-RELIABLE operation is always assured when you use ESSCO R/C products. . . . Send for FREE Catalog listing all new items that appear in AIR TRAILS, M.A.N., POP. ELECT., etc.

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OPEN CIRCUIT METER or KEYSER JACK.45
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SHOCK-PROOF KEYSER PLUG & JACK, per pr.	1.25
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2 PIN, 4 PIN, or 5 PIN, plug & jacks.15
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For use with the NEW TWO CHANNEL receiver & most other audio sets. Basically this is the IMPROVED ESSCO LORENZ MOPA XMTR with the NEW ESSCO STABLE MULTI-TONE MODULATOR. Unique—Reliable simple circuitry & assembly makes a powerful transmitter for use with single or multi-tone audio & regular CWV signals. Complete ESSCO H.Q. parts pkg. with easy-to-follow instruction dwys. Includes all materials required (no extras except batteries). \$49.95

THE ESSCO MULTI-TONE MODULATOR, a stable and reliable modulator for use with most existing transmitters. Allows you to go to multi-channel work easily & inexpensively. Complete ESSCO H. Q. parts pkg. \$19.95
THE ESSCO RCX HP II, ESSCO's SUPER MAC II XMTR. A complete HI POWER (5 watts) unit with built-in power supply, 2 volt cell W/6-12 VDC & 110 VAC charger. Special metering system for external use with 0-5-50-250 volts & 0-5 ma. Case size only 5x9x6. Featured in AT Blue Ribbon Febr. 1955. Only. \$49.50
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ESSCO - WEST COAST

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Under Control

(Continued from page 68)

trol escapement (or any other second escapement you want to use) is operated by giving a very fast blip to the control button, then letting it right up; this steps the second escapement to the next position—it must be a type that will hold a desired position without the current to it being held on. There is no overtravel with this type of Compound, and it will work with 1/4" rubber, if desired. It is ideal for use with the Tuned-Relay receiver described in this issue.

Fixed pitch props can only give top performance at one certain speed of your plane, but the Talmco-Elmer Automatic prop is said to adjust itself for any speed or attitude of the model; at takeoff and during the climb, the prop stays in low pitch, to allow the engine to rev up for plenty of pulling power. In a dive, the prop goes into high pitch so the engine won't overspeed, while when the engine stops, the prop blades automatically feather, to cut drag. Prop is made to fit engines from .09 to .35 cu. in., and adapters are sold that enable it to be used on many of the popular engines sold today. Prop costs \$5.35 from Talmco Microvics (Box 125, Oakland Gardens Sta., Flushing, N. Y.). Blades are of tough cellulose acetate plastic, and if broken, new blades may be had for 75¢ each. Props may be had to fit all Fox, McCoy, K&B, Forster and Veco engines of less than .35 cu. in. size.

New sub-miniature 3-tube AF tone receiver may be had from H & M Radio Controls (619 E. Budlong St., Carthage, Mo.); set measures 1 13/16" x 1" x 3" long and weighs 2 2/3 oz., sells for \$24.95
(Continued on page 88)

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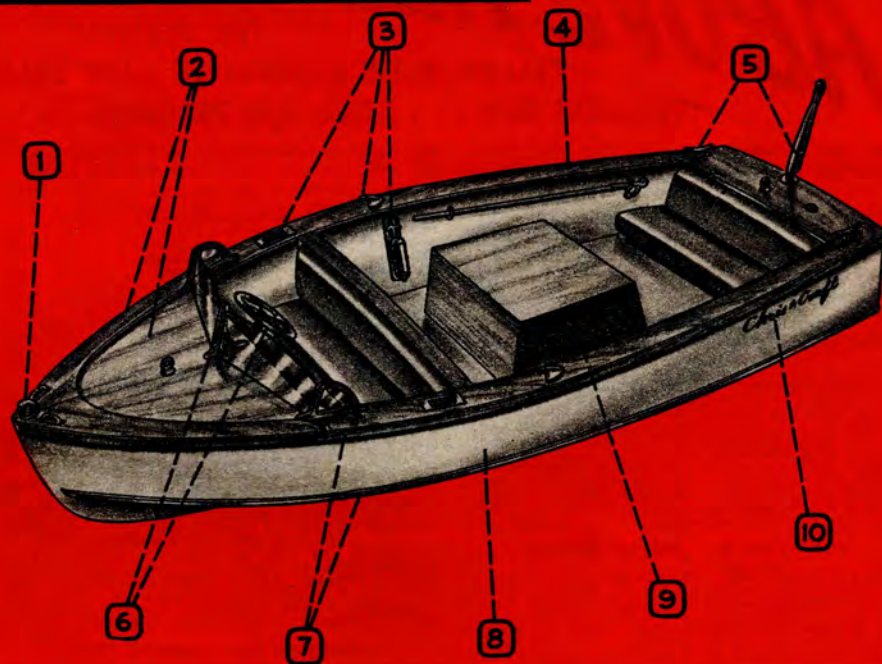
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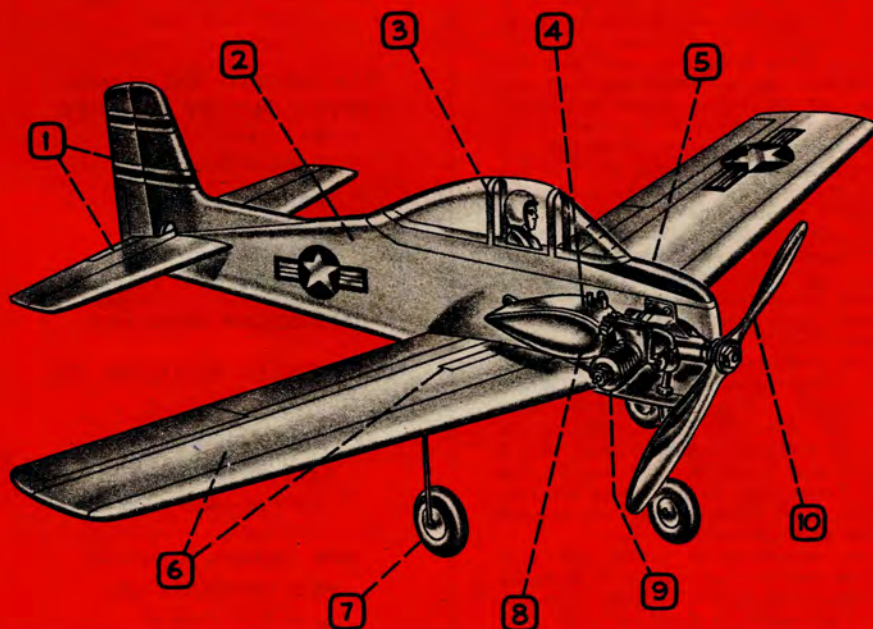
Dyna-Model's C-C 17'



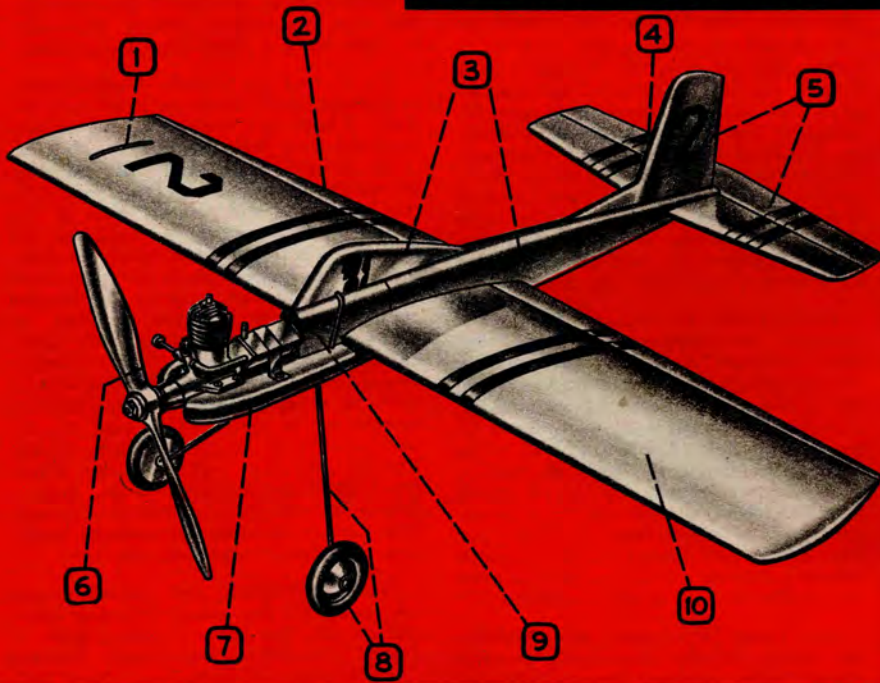
■ Full title of this appealing boat is 17-foot inboard Chris-Craft Sportsman. Scaled 1 inch to foot by Dyna-Model Products (76 South St., Oyster Bay, N. Y.). Following are some items of interest: 1) cast metal bow light and chocks. 2) die-cut mahogany veneer deck and trim; 3) cast metal steps, vents, fire extinguisher, etc.; 4) die-cut veneer side decks; 5) cast metal cleats, stern light, rudder, etc.; 6) cast metal brackets, wheel, throttle, etc.; 7) balsa fender and chine rails; 8) fully hollowed, shaped balsa hull; 9) die-cut parts for engine box, seats, etc.; 10) authentic decal insignia. (Note: rudder, anchor, propeller, etc. also supplied.)

■ A-J Aircraft Company's powerful new performer is Jim Walker's cute control line craft. Features of special note include 1) shaped balsa tail group, elevators hinged; 2) finished balsa profile fuselage with hardwood nose section; 3) formed canopy and color printed "profile" pilot; 4) special long range fuel tank included; 5) complete "U-Control" system with remote throttle control, flight lines, handle, etc.; 6) formed balsa wing parts with dihedral joiner; 7) finished tricycle gear with rubber-tired wheels; 8) assembled engine exhaust and intake speed controls; 9) .065 Jim Walker "Firecracker" engine supplied; 10) adjustable metal propeller.

Jim's Fire-Bee



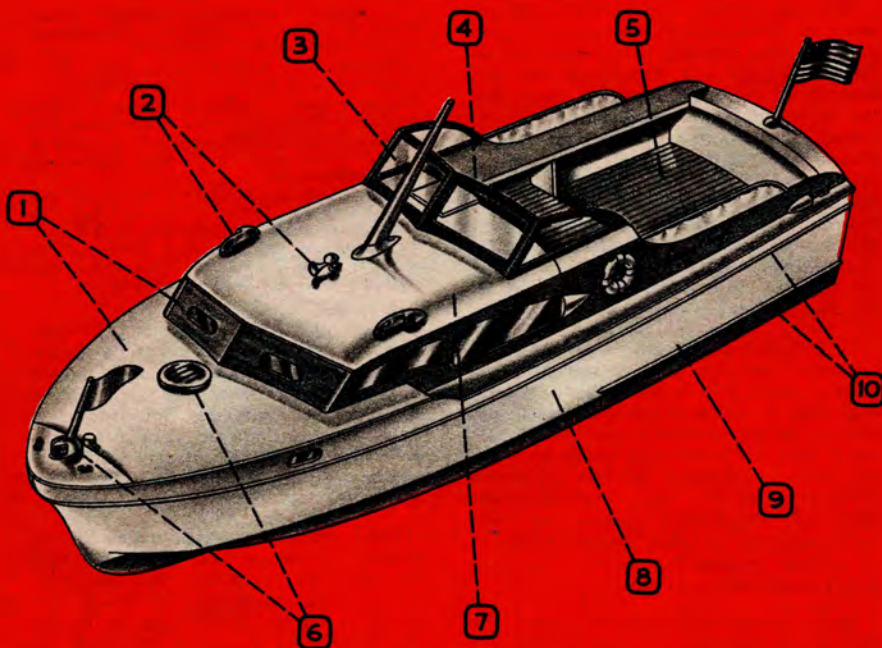
Guillow Trainer



■ From the Guillow concern comes this latest "Profile Basic Trainer" especially designed to take medium-size engines and the hard knocks of novice flying. Maker is Paul K. Guillow Inc., Wakefield, Mass. Items of particular interest include 1) die-cut plywood wing guide; 2) die-cut balsa "fixed" flaps; 3) die-cut profile "canopy" and shaped balsa fuselage; 4) complete hardware for "U-control" system; 5) die-cut balsa tail parts; 6) .14-.19 cu. in. displ. engines recommended; 7) fully shaped hardwood motor mount; 8) formed steel gear struts, turned wooden wheels; 9) shaped hardwood front section; 10) completely shaped balsa wing.

■ From Berkeley Models (West Hempstead, N. Y.) comes this sleek Chris-Craft 32' Cruiser model with molded plastic hull to save long hours of construction time. This is a big job that's 32 inches long. Notice 1) die-cut mahogany veneer deck, side panels, etc.; 2) cast metal lights, horn; 3) die-cut plastic windshield; 4) complete interior detail shown on plans; 5) installation shown for gasoline or twin electric engines, radio control; 6) cast metal hatches, light, mast, cleats, etc.; 7) completely molded plastic cabin unit; 8) molded one-piece plastic hull; 9) all formers and internal structure cut to shape; 10) all strips cut to dimension.

Berkeley's C-C 32'



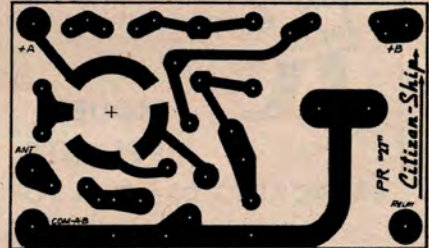
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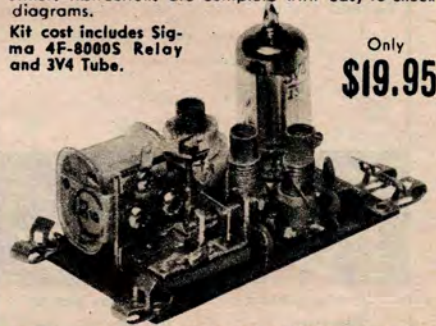


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Kit cost includes Sigma 4F-8000S Relay and 3V4 Tube.

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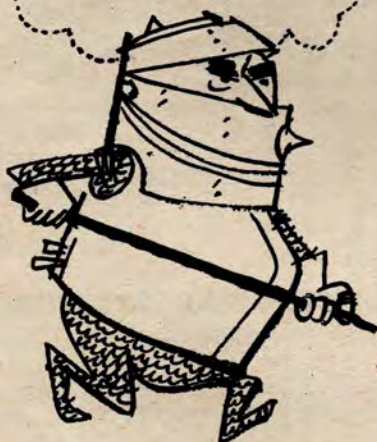
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Don't sit back



STRIKE BACK!



Give to
AMERICAN CANCER SOCIETY

Ceramic Engineer

(Continued from page 70)

take up the study of ceramics.

It should be mentioned that in a number of instances the college with a ceramic course may have on tap scholarships that apply to students in general, including the ceramic-minded. Individual industrial firms often have their own scholarship programs. The setup as a whole changes from year to year. For all of which reasons, the best way to learn about scholarships is to contact the school of your choice and ask concerning its current program in this respect.

You'll recall we pointed out that a common misconception is the belief that "ceramics" refers to just pottery or dinnerware. This comment was by no means intended to detract from or minimize the importance of such items in the ceramic field. Art pottery and tableware come under the general heading of "whiteware," which also includes products like chemical and electrical porcelain, sanitary ware, floor and wall tile. The whitewares branch of the ceramic industry does an annual business of more than \$400 million in this country.

Our friend Dink, you'll again remember, made slightly disparaging remarks about "little cups and saucers." Besides not realizing that engineers are needed in their manufacture, he didn't know that the entire sphere of dinnerware—china, earthenware, crockery, and porcelain—is flourishing as never before in the U. S. The war had something to do with it; as imports were curtailed, American makers and designers learned they could do as well and better, and today there is a booming market for "home-grown" china and artware in even the luxury brackets. All of which of course means more engineers and technicians are needed.

Ceramics have rigidity and strength. They insulate against heat and electricity. They won't corrode. It is such varied properties that are extending the range of their usefulness. Dr. A. B. Kinzel, Vice-President in Charge of Research for the Alloys Group of Union Carbide and Carbon Corp., has observed:

"Ceramics, long outstanding with respect to temperature and corrosion resistance, are coming into wide use as their strength and toughness are improved. Much remains to be done, but the scientific approach has already resulted in such new ceramics as silicon nitride and various metal silicides, borides and carbides, not to mention metal ceramics. Potentialities in the field are impressive, and the new ceramics promise better furnaces, better chemical plants, better cutting tools, and better jet engines, to mention just a few of the items making for better living."

If you are interested in a career in ceramics, you can take certain steps as of now, while still a high school student. Dig into as much math, chemistry and physics as you possibly can. That's not "stuff and guff"; surveys made by leading engineering societies and educators show that far too many high schoolers have had insufficient training in these basic subjects to meet the requirements in college engineering courses, and ceramic engineering is no exception.

Learn everything you can about the subject of ceramics. If you live near a ceramic manufacturing plant, take advantage of group field trips that may be

arranged between your science teacher and the officials of such companies. Read all the books on ceramics available to you; chances are you'll find some in the local or school library, especially if these have a Technical Department.

Try to visit the Corning Glass Center, at Corning, N. Y. Referred to by the New York Times as "certainly one of the most fabulous places in the world," this is the largest permanent exhibit of glass to be found anywhere—and more. In the lobby you will see the twin of the 200-inch telescope mirror made for the Palomar Mountain Observatory in California, the biggest piece of glass ever cast. The Museum part of the Center contains objects of glass showing its entire development through the ages. In the Hall of Science and Industry visitors may view all the applications of glass in today's living, with pushbutton movies on its manufacture, and the actual making of laboratory ware. In the Steuben Factory part, you can watch from the balcony as craftsmen fashion pieces of the famous Steuben crystal. The Center includes recreational facilities, with plays and festivals held.

Both individuals and school groups are welcome. For pamphlets and information on the Glass Center, write to Public Relations Department, Corning Glass Works, 718 Fifth Ave., New York 19, N. Y. Also available is a motion picture film on the subject, loaned free of charge to groups. Have your teacher or leader write to the above address.

Glass itself is merely one of the main branches of the ceramic industry. There are a number of free pamphlets and booklets that will help fill in the whole picture for you, acquaint you with the other principal divisions and inform as to the educational background involved generally.

The American Ceramic Society has just issued a brochure entitled "Explore a World of Ceramics." Write to General Secretary, American Ceramic Society, 4055 North High St., Columbus 2, Ohio.

These also may be had without charge:

"A Career in Ceramics as Engineering and Technology." From: Pennsylvania Ceramics Association, Inc., Mineral Industries Bldg., State College, Pa.

"A Modern Profession—Ceramics." From: College of Mineral Industries, Pennsylvania State University, State College, Pa.

"Ceramics," by Lane Mitchell. From: Georgia Institute of Technology, Atlanta, Ga.

"Shall I Study Geological Science?" From: American Geological Institute, Washington, D.C.

"Refractories and Bill Smith," by Earl A. Garber. From: Harbison-Walker Refractories Co., Pittsburgh, Pa.

"There's a Bright Future for You in the Porcelain Enameling Industry." From: Porcelain Enamel Institute, Inc., Washington 6, D.C.

"Ceramics in the American Economy," by Betty Deem and John D. Sullivan. From: Battelle Memorial Institute, Columbus, Ohio.

Among the books that may be purchased, we recommend as having special interest to high school students "Opportunities in Ceramics," by Dr. Samuel Ray Scholes, Professor Emeritus, New York State College of Ceramics, Price \$1. Order from: Vocational Guidance Manuals, 45 West 45th St., New York 36, N. Y.

Other publishers with titles in ceramics on their list are: Industrial Publications, Inc., 5 South Wabash Ave., Chicago, Ill. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. Write to these firms for titles and prices.

Hobby Model World

(Continued from page 47)

WESTERN ROUND-UP

Slipstream Effect. In the past month there have not been any large contests in Southern California, but there have been some of the regular monthly meets; one produced some very interesting data.

The subject was the effect of slipstream brought on by the latest ships of Stan Hill and Dick Everett. Basically both ended up with rudders underneath the stab, both were designed this way for the same reason: V.T.O. Most interesting was the identical result this method of design produced—a right turn with no side thrust. Dick Baxter suggested this about three years ago as the possible cure for a left turn that a pylon model seemed to have. Basically what happens is that slipstream is the little devil which is the cause of this turn, twisting around the fuselage until it very effectively banks the model to the right. Added fuel to slipstream effect theory was the data presented by the NACA personnel from wind tunnel tests in the Free Flight Tunnel with one of Frank Parmenter's "Swooses."

It was found that with the engine running his model had a natural right bank; with engine off, none. When the covering was removed from the pylon and with the engine running, the same model had a rolling moment to the left due to torque action. Carrying this farther, it could be pointed out that the position of the area of the pylon, due to this slipstream, could be important, and also, as most contest modelers have found out, pitch and diameter of the props change the power characteristics of our models. All in all it should be pointed out that this slipstream undoubtedly contributes more to our power problems than most of us realize. All because these VTO flights need a stable rear platform that doesn't get knocked askew when one sets the model down for take-off. To discover this slipstream effect, you need only to vary the ventral or sub rudder area and/or prop pitch to get an eye-opening demonstration.

Lucky Westerners. Another discussion about flying fields at another contest led us to believe that we are better off in facilities than most of us want to admit. From all over we hear about the lack of flying facilities. Perhaps they aren't as good as years ago, but there are still plenty available. In Los Angeles, San Bernardino and Riverside Counties we have Vessels Ranch for free flight, Sepulveda for free flight, Santa Anita and Hollywood Park for team racing, Pomona and Ontario for U-control, Ontario and Corona and other race car tracks, the peer of all outdoor sites at the lakes, and many other places too numerous to mention. San Diego has a combined free flight and U-control site on Kearney Mesa, a U-control area in the Bay Area as well as a perfect model yacht basin, Bakerfield, Taft and Fresno, free flight areas, Phoenix has its own model airport, Tucson also has one. Adding all this up, are we really running out of flying areas? It does seem like there are plenty.

Payload Prospects. Conversation along payload lines points to 15 ships which will be along the same lines as last year, except for the large 850 sq. in. jobs like Jack Oxley's. Most guys seem to be set-

(Continued on page 94)

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PUG-NOSE RACING PRAM by William "Bill" Baughman, 14 inch overall length scale model of Chris-Craft's 10' pram. For outboard glow plug engine. Beam is 6 1/4".
CHANCE VOUGHT OS2U-1 KINGFISHER control line flying scale model plane by Albert E. Christen. Takes engines from .14 to .29 size. Spans 24"; overall length is 19".

GROUP 253R — STUKA HAPPY MEDIUM, by Shailor, F/F, 70" span. THE EXECUTIVE, by Hunt, Twin Jetex, 18" span. DOUBLE WHAMMY, by Hughes, C/L Biplane, 37" span.

GROUP 553A — SASSY SAUCER, C/L by G. L. Harris, 25 1/2" diameter. SWEET SIXTEENTH, F/F by Kochman, 32 1/2" span. LIBERTY BELLE, R/C by Dick Schumacher, 42" span.

GROUP 1053 — DOUGLAS AD2 SKYRAIDER C/L by Cal Smith, 44" span. "X-PENDABLE" combat stunt by Seftig, 38" span.

GROUP 154 — TRIMMER AM- PHIBIAN, by Planek, C/L twin engine, 42" span. SWAYBACK, by CPO Henebry, USN, F/F, 1 1/2 A, 37 1/2" span. DRAFTY JUNIOR, by Musciano, Stunt, F/F, 36" span.

GROUP 654 — BELL P-39 AIRACOBRA, scale C/L fighter plane by Musciano, For .14 to .35; spans 28"; length 26". MCGOVERN'S MONSTER by Don McGovern, Giant-size ROG-RON amphibian F/F for R/C work, Spans 114"; length 92". .65 to 1.25 power plants.

GROUP 1254 — DOUGLAS C-47 (DC-3), Twin engine flying scale control line model by Walter A. Musciano, 47" span; 31 1/2", overall length. Takes two engines from .14 to .23. RACING RAFT by Bill Baughman, Sport racing boat for glow plug outboard engines, 16" overall length, 6" beam. FLY-HI outdoor hand launched endurance glider by Vern Clements, 15" span, 18 1/2" long.

50¢ for each complete group above

GROUP 953A — GRUMMAN F4F-4 WILDCAT C/L by Walt Musciano, 3/4" to 1" scale. DEVIL DART by Tommy Baker, 18" span Dyna-Jet powered.

GROUP 953B — HAWKER HURRICANE C/L British flying scale by Musciano, 3/4" to 1" scale. LITTLE AUGIE by Frank Ehling, Jetex No. 150, 22" swept-wing semi-scale fighter.

GROUP 854 — CONSOLI- DATED B-24, flying scale C/L by Lashok and Cal Smith, 2 or 4 engines. Spans 73"; 42" length. BUFFALO SPEED BUGS, air-prop race cars for Half-A engines. Attach to tether and center post. SKID-DIN' II, Frank Ehling's outboard engine race boat. Length 21"; beam 7 1/4".

GROUP 155 — PIPER CUB J-3, R/C flying scale model by Hollinger, Spans 70"; length 44". LITTLE ARKY, scale-type Arkansas house boat. Length 12 1/2"; beam 4 1/8"; height 4 1/2". JAMBOREE stunt model by Maj. Bourgeois. Engines from .19 to .23; spans 3"; length 27 1/2".

GROUP ATA 542 — "LITTLE FREAK #27 by Dale Root. Thermal hopper engine. Spans 44", has 30" fuselage. Will take Super Aerotrol or similar equipment. XF-92A — Control line jet-powered flying scale Convair delta model by Frank Lashok. For Dyna-Jet power. Spans 31", 41" long.

GROUP ATA 543 — "A-PAY" by Frank Ehling, PAA-Load model for Class A competition. Takes Torp .19, spans 58". Four foot fuselage. Steb- ahead-of-rudder design. RE- PUBLIC P-47 THUNDERBOLT — Control line flying scale by Musciano. Three versions, the "B", "D" and "N". For power plants in .14 to .35 range. Spans 32", fuselage length 26".

GROUP R101 — MAC'S RO- BOT, by McElwee, R/C, F/F, 60" span. Plans and Building instructions for BEEP BOX, RE- CEIVER and TRANSMITTER.

GROUP 953C — FOCKE- WULF FW 190 — German W.W. II C/L flying scale by Musciano, 3/4" to 1" scale. A/2 VIKING NORDIC TOWLINE GLIDER by Bill Farrance. Half size plans with full size ribs and cross sections.

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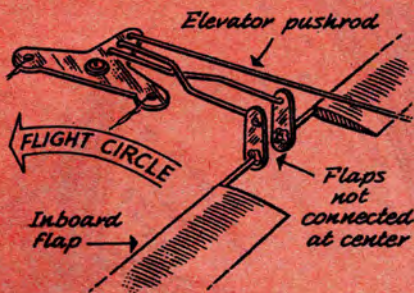
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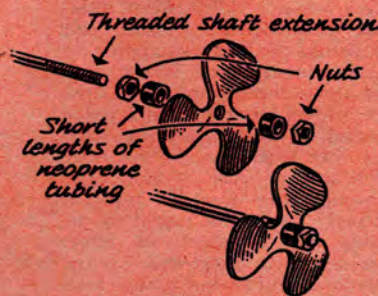
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Darrell Dolgner, Washington, D.C., rigs inner flap for more movement to prevent inward banking upright or inverted.

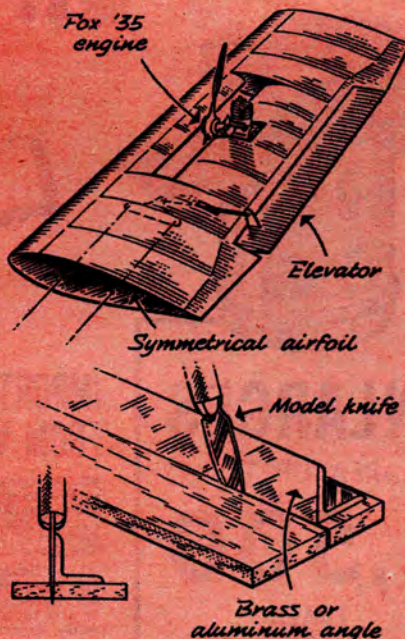
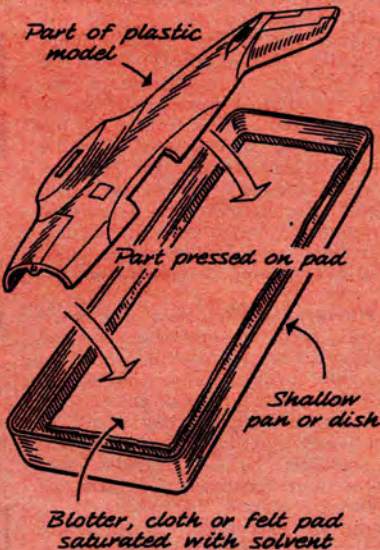


Parts container made of tin cans, cut in halves, soldered at edges, is shop tip of Terry Vick, Oakland, Calif.

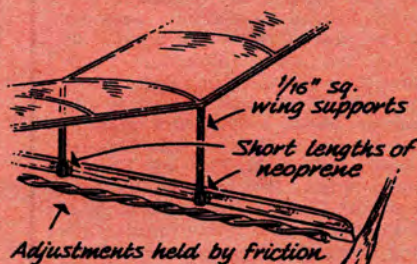


Special propeller mounting for model boats will not loosen in use is claim of Lawrence Elwell, Budd Lake, N.J.

John Secord, Detroit, Mich., submits method of applying bonding solvent quickly and evenly to plastic model parts, assuring neat, strong seams.



To assure perpendicular edges in strip cutting, Charles Sobich, Chicago, Ill., uses angle stock cutting guide; rests model knife flush against it's vertical edge.



Light indoor (tissue-covered) model has adjustable incidence for flight trim... Submitted by Gerold Maranhã, Lansing, Mich.; used by his club.

Model Boating

(Continued from page 15)

yacht sailing.

We have recently received from Mr. L. Gesbeck (7345 S. Blackstone Ave., Chicago 19, Ill.) Treasurer of the M.Y.R.A.A., a set of the publications that this organization has available at low cost to members of the Association. Most of them are in the form of paper-covered booklets, but there is one mimeographed set of sheets on "Rating Rules for 36" Class for Juniors"; this one covers both the "J" Class which are individual designs, and the "S" Class, latter being the one-design 36" Sharpie. Other publications and their costs are: "Constitution and Regulations" (of the M.Y.R.A.A.)—50¢; "Standard Starting Schedules" for Model Yacht Racing—20¢; "Skiff Sailing Rules" (for handling yachts from skiffs)—10¢; "Pond Sailing Rules and General Rules"—50¢; "M-Class Rating Rules" (for the Marblehead 50-800 Class boats)—10¢. We believe the Association can also supply publications relating to other classes of model yachts, and interested parties should contact Mr. Gesbeck for information.

Some outboard speed hints are sent in by Oliver Schmidt Jr. (4945 N. Washenaw, Chicago 25, Ill.), who has raced the full-size "shingles" for over 10 years. First, he notes that for top speed the alignment of hull bottom and fin is most important, and that the transom should be extra sturdy to cut down vibration. Besides normal hopping-up of engines, it is often possible to get a boost in speed by arranging a small tube and funnel to force more air into the intake, especially on those engines that don't have a forward-facing intake. The underwater parts of the engine can be streamlined more carefully, and you can put oil in the gear housing instead of grease (but if you do this, check often for leaks and to replace oil).

Besides tying the engine to the boat, Mr. Schmidt suggests tying it to the clamp, so that the engine can't kick into the boat if it should stop suddenly while traveling at high speed. He says that slight porpoising will give highest speed on smooth water, but in choppy water, level riding is necessary to maintain control. Most important of all is to have the engine height and angle correct; the engine should be as high as possible, and it is often better to risk slight prop cavitation than to have the prop too deep.

Tilting the engine to reduce porpoising is the wrong approach, as this cuts speed too much; it is better to build out a small "tail" on each side of the prop. In other words, you extend the hull bottom a small amount, so that the boat has a longer "wheelbase," to keep it from rocking.

More outboard notes come from Monty Howard Jr. (Route 1, Box 89F, Virginia Beach, Va.), who has been running a 15½" racing pram, equipped with two Allyn Sea Furys. Monty says everyone who sees this rig immediately comments on how tough it must be to get both engines running at once, but actually there is no trouble this way, as they are well broken-in, and start on the 2nd or 3rd pull every time. When first run, the boat has a tendency to bounce badly when it hit waves or the wake of another boat; this was cured by cementing two .45 slugs in the tip of the bow. The hull bottom has three fore and aft "ridges"; as you look at it from the front there is a ridge on each side and one in the center,

(Continued on page 85)

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FOUR ACE TRANSPOSITION

■ A great many tricks have been built around the use of four cards, particularly the four aces. Some of these require the use of special decks or at least marked cards, but the one described here can be accomplished with any deck. And it takes no more preparation than sorting out the four cards to be used. The effect, in brief, is this: Four aces are dealt face down in a row. Each is covered with three ordinary cards. The spectator chooses one pile and is allowed to pick up that pile. He finds all four aces in the group he chose. The other three piles contain no aces.

The success of this trick depends on very simple sleight-of-hand that is neither difficult nor does it require long hours of practice. It must be coupled, however, with a certain amount of what is known in the world of magic as misdirection—control of the spectator's attention so that he does not notice the sleight-of-hand. Most successful magic tricks employ one or both of two principles: 1) the spectator is led to expect a different type of trick from that which you are about to perform, and so is not watching for the kind of sleight you must use; 2) the basic move of the trick is accomplished before members of the audience expect it. Thus, when they start to watch you most closely, it is already too late for them to catch on. The trick described here employs both.

Deal the four aces face up in a row in front of you. Ask a volunteer to arrange them in any sequence that he thinks he can remember. Say that this is a memory test and he must try to remember the order in which the cards occur. While this nonsense is going on, place the rest of the cards face down in your left hand, drop both hands to your lap, split the deck about center and invert the bottom half. Now, whether your left hand is held palm up or palm down, the upper half of the deck will have cards with the backs uppermost.

If you are sitting, I find that it is best to rise at this point. The other necessary moves seem more natural if one is standing. Hold the deck in your left hand, palm up, at an angle which will not permit the spectators to see the bottom of the pack. Slowly and carefully place each ace, one at a time, on the top of the deck. Success of the trick depends on the spectator being convinced that the aces did go on the top.

State that you will now deal out the aces face down and ask the volunteer what the first one will be. He will name it correctly, of course. Deal the top card as he names it and turn it over for everyone to see—apparently to check his memory. During the moment that

the spectators glance at the card, drop your left hand to your side, and, in so doing, turn it palm down. The cards must project enough between the thumb and index to permit dealing. Turn the ace just dealt face down and lay it on the table. Return the left hand, still palm down, to a position for normal dealing. The other three aces are now face up on the bottom of the deck. Deal the top card, taking care not to expose the face, and lay it beside the ace, saying something to the effect that "And this is the ace of ———." The innocent victim will supply the name of the ace he thinks it should be.

Do the same with two more cards. Four cards are now in front of you, but actually, only one is an ace. Say that you will now cover each ace with three ordinary cards. Deal three cards onto the table on top of the last card you had just laid on the table. You may expose the face of these for the effect and then lay them face down on what is supposed to be an ace. Cover the other two "pseudo-aces" in the same way, but do not show what cards you are using to cover them.

As you finish covering the third card, pretend to lose track of the number of cards dealt. Spread them slightly with the right hand to be sure there is a total of four in the pile. During this bit of misdirection, drop your left hand to your side, and then bring it back in position to deal, palm up. The other three aces are now on top of the deck and are quickly dealt onto the ace already on the table.

It is necessary to have the spectator choose the pile which contains the four aces and make him think he had a free choice. Ask him to point out two piles. If his choice includes the one with the aces, remove the other two. If it does not, remove the ones he chose. Ask him to choose between the remaining piles and, in the same way, force his choice. If he picks the one with the aces, fine. If not, remove the pile he picked. This leaves one pile which the spectator feels he has, in some way not quite clear, chosen. During this time contrive to straighten out the inverted half of the deck so that it may be placed on the table without giving away the trick.

The climax may be done in a number of ways. Usually, I say: "I guess we'll have to do the memory test some other time. The ace in the pile you selected invited the other aces over for bridge so they are all over at his house." And so saying, turn over the three piles with no aces. Let the spectator turn over the one that's loaded.

—By K. A. WAGNER,
Norfolk, Va.

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Model Boating

(Continued from page 83)

sort of like a shallow figure 3 with the points down.

Boat is named "Watch It," this odd name having been bestowed after it had plowed a big hole in a cabin cruiser and overturned two runabouts (bet the owners of these unfortunate craft had other names for the twin-outboard speedster!).

A new R/C model use was shown in reports from Paris that a builder has a working R/C drydock! This "craft" can be made to take on ballast till it is floating low in the water; then an R/C boat may be maneuvered into the dock, and the latter will slowly discharge the water ballast and raise the boat out of the water. The radio drydock is about 5' long, and its pumps are controlled by the remote signals.

Commercial Notes. We hear rumors that experimental Allyn outboard engines in .074 size have been tried out on the West Coast. Our informant said the motors looked just about like the Half-A Allens, but could push a really good-sized hull. We don't know if this one will be marketed or not. Another outfit, Ohlsson & Rice, said to be working on a rather radical small engine. Also, several kit manufacturers are awaiting the new IMPEA racing rules with the idea of marketing some boat kits strictly for speed competition.

Kit that makes it possible to convert standard air-cooled model engines like the Fox or K&B to water-cooled for boat uses is sold for \$1.95 by Henry F. Parks Laboratory (104 S. E. 57th St., Portland 15, Ore.). Includes Nylon scoop and strainer, intake and exhaust tubes, water jacket, metal couplings, gaskets, hardware etc. Installation time said to be only 15 minutes. This concern also sells a Nylon fuel line strainer made to fit 3/32" fuel line, for 39¢.

Several new developments from Sterling Models (Philadelphia, Pa.); one is a super-cruiser kit—the Chris-Craft 42' Corvette. This is Kit B-15M, sells for \$24.95, with metal fittings kit B15F at \$8.95. Model is 48" long, about 14" wide, has 2½ sq. feet of open floor space for radio or other apparatus. Pair of Nylon props (right and left hand) for twin-screw operation come in kit. Sterling has added right-hand props in 2" (\$1.00) and 1½" (75¢) to its line, which already had left-hand props in these sizes. At other end of boat size scale is an all-plastic model of C-C 42' Express Cruiser, kit having 73 molded plastic pieces in three colors. This craft is 14" long with 4" beam, is designed for shelf or power modeling, and sells for \$1.98, less motor.

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This year the famous Air Trails MODEL ANNUAL'S "Directory of American Model Clubs" includes model boat clubs and race car groups as well as the established model-plane organizations. This time you are the major interest.

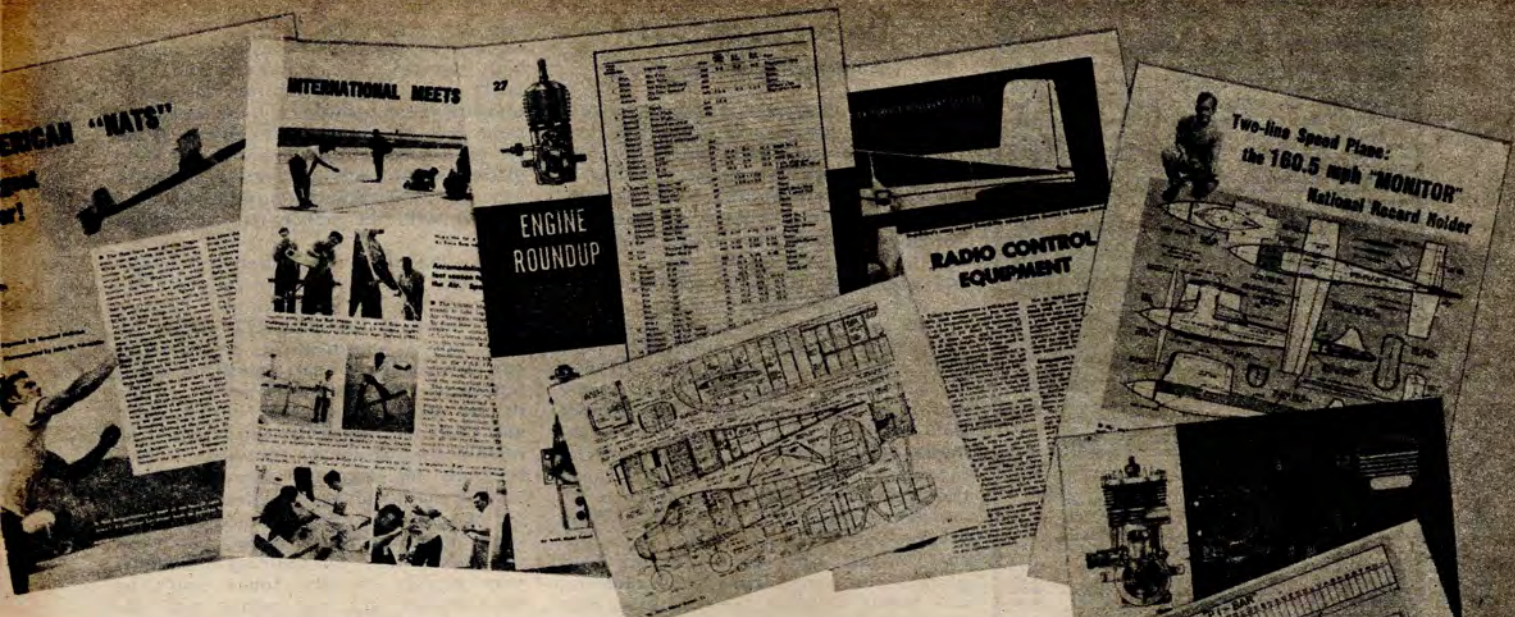
WHO'S WHO OF MODEL RACING

Something to make the miniature race car fan jump with joy is the pictorial roundup and accompanying story by Bob More on the "National Model Race Car Competition." Meet all the big shots and record breakers of the model race car world! Performance data on every entrant who raced at Evanston.

DATA ON NATIONAL MEET WINNERS

All the facts and figures on just about every 1st, 2nd, and 3rd place winner in the U. S. Model Aero Championships of 1954 (thanks to the flyers themselves for their magnificent cooperation!). What engine was used? Type of plane? Was it a kit? Fuel? Wing section? Finishing method? Etc., etc.





RADIO CONTROL? WHY, CERTAINLY!

No need to dwell on Cal Smith's Monocoupe or Walt Musciano's ferry boat—they "sell" on sight! What we want to call your attention to is that very helpful compilation (with data table!) on "Radio Control Plane Kits" and the photos and specification charts on R/C equipment for every surface movement.

WORLD CHAMP SPEAKS HIS PIECE

Lead-off article is by world air-model free flight champion Carl Wheeley of Washington, D. C., who explains the whys and wherefores behind his "Senior Senator" design. Plans by Cal Smith. Cutaway drawing by Douglas Rolfe.

PLENTY OF PLANE MODELS, TOO

Air-modelers will welcome with considerable interest and construction activity such outstanding features as Cal Smith's tricycle gear postwar Monocoupe which is just perfect for radio control; Roy Clough's semi-scale Sikorsky R-6 helicopter for powering with any .049 engine, a real eye-opener; Paul Palenek's control line miniature of the Central Lamson air tractor crop duster (for .14 motor) and Leland Morton's remarkable 160.5 mph speed model record holder.

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Under Control

(Continued from page 77)

ready to use. Receiver is canned for protection and the relay is inside the case. There is only one adjustment—for tuning. Companion transmitter operates at low current drain on 135 V. B. battery; utilizing two-tube circuit, it sells for \$34.95 in finished form. H & M are putting in stock of all sorts of R/C parts and equipment, to be of greater service to radio control experimenters.

Two gas tube receivers are available from Raytrol (51 Hamilton Pl., New York 31, N. Y.). Single tube style is Model 100 and sells for \$9.95; Model 200 is a two-tube selling for \$15.95. Both receivers are protected by high-impact plastic cases and feature a special inductance that allows very high sensitivity. Antennas may be as short as 6".

Several new items from Citizen-Ship Radio Corp. (Indianapolis, Ind.) include a kit with printed-circuit base plate for a single hard tube receiver; uses Sigma 4F relay, has slug-tuned coils for tuning and sensitivity. This is the PR receiver kit. A new escapement that has a "governor" wheel and gives right or left turns without any sequence is the SE model; very light and compact. Another new one is a lower cost 465 mc. transmitter—Model CC1. Looks about same as the former 465 transmitter, but sells for \$34.95, with tube and antenna; hand held, of course.

Two-Channel "TR"

(Continued from page 53)

Needless to say, the smallest possible commercial parts must be used. Some hints on suitable parts are given at the end of this article for your convenience. All the diodes are of the same type, and those of recent production are much smaller than earlier ones, measuring about 1/8" x 3/8" in size. The diodes must be polarized exactly as shown; the straight line on each diode represents the cathode, which is marked by a line on the actual units. When soldering these parts in place use no more heat than necessary, and hold the diode leads with a pair of long-nosed pliers, to keep the heat from damaging the elements.

Though they are not shown, spark suppressors should be installed on the relay contacts that are in use.

A vital part of the circuit is the "clipper," those two diodes D1 and the resistor R1 connected across the output side of the AF transformer. Some experiment with the resistor value may be needed; if you get considerable reading (say, over a half ma. or more) on one output channel, when the other tone is being sent, this resistor should be reduced. The clipper acts to hold all signals going into the relay tubes to a fairly constant level, regardless of signal strength. If you have a VT voltmeter, it should show a reading of about 1.5 V AC across the output winding of AFT. If it is much lower than this, the simultaneous operation of both channels will suffer, while if much over 1.75 V., the current reading on one channel (when you are keying for the other one) will be too high.

When you first connect up the receiver, it is a great help to have two meters (0-5 ma. is just right), one for each channel. Since there are 100 ohm resistors across the meters—to make possible use of single circuit meter packs—the meters will read a little low, so take this into consideration when setting your re-

lays. On a good hot 45 V. battery, the receiver shown gives about 4 ma. on the high channel, and 3-plus on the low; fairly close to the transmitter, the simultaneous meter readings will be about the same or a bit lower. If the clipper is set for good simultaneous operation at good distances, the receiver tends to overload (the unwanted channel current goes over 1 ma.) with the transmitter very close by.

Now about this simultaneous operation; first off, if you want to work two escapements, as did Howard Bonner, you'll have to use a DPDT switch for each tone, as shown in Fig. 3. Trace this out and you'll see that a push on either button will send the tone marked, while if you are holding either button down and push the other, the third tone (the middle one) is always transmitted. This is handy for stunting, when you might want to hold rudder operation, while applying some elevator, and makes possible some breathtaking maneuvers. To work this successfully, the switches must shift very rapidly, so the tones won't be momentarily cut off, while you are switching from high or low to medium. Bonner and Everett worked out an arrangement of four SPDT micro-switches, connected as shown and worked two at a time, that has proven very satisfactory.

As noted earlier, simultaneous operation was found to be much more satisfactory, with the middle tone of the Babcock transmitter raised about 300 cycles (original Babcock middle tone shown dotted on Fig. 1). The easiest way we could find to do this was to shunt a small choke across the tuned circuit in the transmitter that provides the middle frequency; unfortunately, just any choke will not do the job. One we found to work well is listed at the end of this article; it has to be modified a bit, as shown in Fig. 5. Modified as shown, it was taped to the bias battery in the transmitter to hold it up against the under side of the chassis. The two leads go to the contact on the control stick which is closed when the lever points to "UP," and to the lug to which the blue wire from the choke case is connected.

If you want to try the receiver with the Babcock transmitter tones as they come, we suggest the following circuit changes; C15 to .002 mf.; C13 to .06 mf.; R2 to 2 meg. If you will be happy with straight two-tone operation without the simultaneous feature, raise C13 to .06 mf. cut R1 to 100 ohms.

Parts Suggestions: All capacitors less than 100 mf., CRL type D6, except C2, which should be CRL type TCZ. Capacitors from 199 mmf. to .01 mf., CRL type DM. Over .01 mf., Aerovox type P83Z. 5 mf. 50 V. electrolytic cond. C9, Barco. All resistors 1/2 W. or smaller. RFC, National R33, 10 microhenry. AFT, UTC type SSO-3. Tube sockets, Cinch 5WC. Relays, Neomatic. All diodes, Raytheon CK 705. All tubes, Raytheon sub-miniatures; three CK506 (or 5672), two CK-536 (or 533); 506's & 536 available from ESSCO. 9 V. bias battery cut down from Eveready type 404E. Choke for raising Babcock transmitter center frequency, Gyro No. RC., see Fig. 5. Coil form, CHC LS6 with Red core, see Fig. 4. Contact ATH advertisers for these parts.

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HOBBY ITEMS IN THE NEWS

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▶▶▶▶▶ From F-B Model Aircraft in Denver, Colo. (3240 Larimer), President Dick Newman sends word of the F-B "Plane of the Year," the Vengeance, for combat, stunt, speed and sport. Wing span is 41 inches; wing area is 369 square inches. Kit with full hardware, rubber-tired wheels, bellcrank and formed landing gear is \$2.95.

▶▶▶▶▶ Dr. Dale M. Hauck won the Los Angeles Radio Control Society's monthly contest last January with a Babcock BCR-4 multi-channel equipped Sterling Tri-Pacer.

▶▶▶▶▶ Latest addition to line of Ulrich HO trucks is the Denver-Chicago van with a Kenworth tractor. Painted in green with yellow lettering, this model looks good on any layout. Features are working wheel bogies and complete undercarriage detailing. Easy to assemble, available with PIE and Garrett names. \$2.50. Also new is Ulrich's Kenworth dump truck and transfer trailer at \$2.75. Ulrich Model Kits, 4233 Babcock, N. Hollywood, Cal.

R/C Your Model Boat

(Continued from page 33)

Multi-Servo, in such a manner that forward, reverse or stop may be had at will. A small 6 V. surplus storage battery operates the drive motor, and when fully charged, should be good for about two hours of running.

The steering is handled by a Bonner motor-driven servo, which will move the rudder to any desired position and hold it there till you signal for a change. Two of the AF tone channels of the Babcock equipment are utilized to move the Bonner servo to right or left as desired, while the third tone controls the Dmeco Multi-Servo. A slight addition to the relay connections in the Babcock receiver is needed for the latter, but this is covered in the Multi-Servo instruction book.

Since the Bonner Servo needs 3 V. and the Multi-Servo should not be run on more than 1½, it is suggested that one of the pairs of D-size flashlight cells be wired up to these two units, with the other two D cells connected in parallel for the receiver filaments. A 67½ V. B battery and 30 V. C battery complete the power supply.

You can get a Babcock Installation kit, which includes all the components needed to wire up and control the equipment. There are two jacks, one for test headphones and one for plate current check, and two switches. One switch can close the receiver A circuit, the other may be used for the Servos. No switch is required for the drive motor, as its circuit is handled by the switch built into the motor, and by the Multi-Servo that moves this switch.

This installation would have to go into a fairly large boat, of course. Something around 30" long or so would be ideal; if you wanted more drive power you could fit two of the Pittman motors, and even use twin rudders back of the two props, for better steering. Incidentally, the switches on the Pittman motors are very stiff; you will have to loosen up the screw that holds the switch lever, so the Multi-Servo can handle the job.

—H. G. McEntee

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Columbia Graphs, Columbia, Conn.



Pocket size microscope weighs barely 3 oz. and measures 2 x 3" yet magnifies objects "2500 times their total surface area," according to the United Importing folks. Two laboratory slides for interchangeable viewing are included in the postpaid price of \$3.95. This is made in Germany and it's called the Mighty Mite Microscope—power in miniature.

United Importing Co., 9043 S. Western Ave., Chicago 20



Ready to fly or float, this Bramco six-reed receiver sells for \$116. Concern also offers the reed unit by itself as a separate deal if desired. Available from Bramco, too, is a 5-reed receiver. The one illustrated here measures 5 x 2 x 3" in its aluminum case. Info on Bramco and other servos is in radio control article in new 1955 Air Trails MODEL ANNUAL.

Bramco Mfg. Co., Birmingham, Mich.



New entry in the "jet-rocket" engine field is Berkeley Models PSST "50" rocket engine. It uses standard fuels available from hobby shops. Gives half-ounce thrust, will power models weighing up to 3 oz. and with wing spans up to 2 feet. Machined head, steel safety spring. Used by Berkeley to power its Swisher and Sil-O-Jets. Costs \$1; 3 for \$2.75.

Berkeley Models, W. Hempstead, N. Y.



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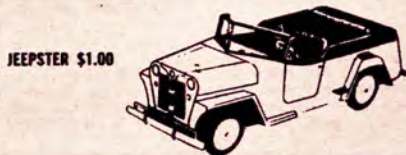
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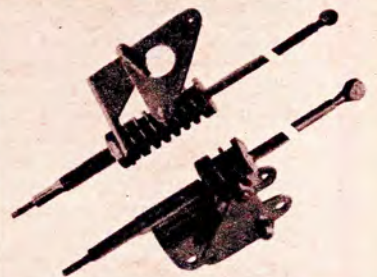
HOBBIES'



Happy thought for simple, ready-to-fly all-balsa-wood stick-type size-off-ground (R.O.G.) rubber-powered model suitable as novice training craft is Testor's 49¢ Little Dipper. Features red plastic free-wheeling propeller assembly and landing gear wheels. Wing span is 18 in., overall length 13 in. Comes in sealed cellophane bag. See rack display at hobby shop.
Testor Chemical Co., Redford, Ill.

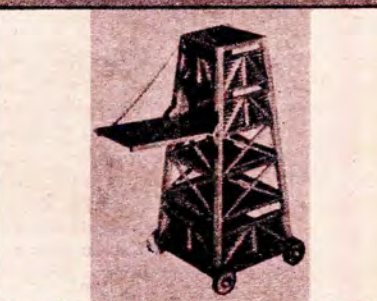
New Mono-Line control units, the "Stunt-Master" (right, top) and the "Speed-Master" are available in Class A, B and C sizes. Former is precision built sensitive control unit for long control lines from 70 to 150 feet. Comes assembled, ready for installation in plane. Speed-Masters were used in new Mono-Line speed record planes.

Victor Stengel & Co., Schenectady, N.Y.



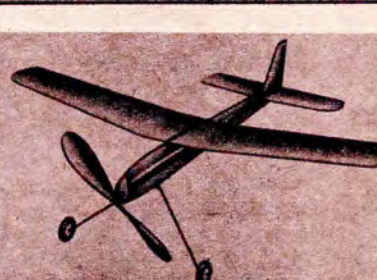
Modern models of ancient war machines are the specialty of Arco Models, N.Y.C. Pictured here is their Storming Tower of approximately 3¼ x 3¼ x 12" proportions. Sells for \$3, plus 25¢ postage. Other authentic replicas of famous weapons include the Ballista, Catapult, Scorpio and Springle. These actually work with a range of from 20 to 30 feet.

Arco Models, 728 E. 190 St., N.Y.C. 60.



Model Builders Course consisting of three planes and a book is kitted by Berkeley for 95¢. Used in many aviation education classes, the models are an all-balsa hand-launched glider, an all-balsa rubber-powered profile flyer and a paper-covered wing, built-up fuselage rubber endurance craft with plastic prop. Comes with 16-page book on building secrets.

Berkeley Models, West Hempstead, N.Y.



We didn't know they handed out free catalogs like this any more! It's a real beauty. Title is "Archery Tackle" and if you've any interest in the hobby-sport be sure to ask for Catalog #155 from L. E. Stemmler. Many of the items are illustrated in full color. Overall result is so appealing you'll have a tough time not sending an order.

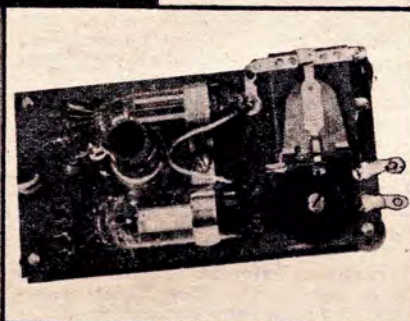
L. E. Stemmler Co., Mahwah, N.J.



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ESSCO Lorenz Uni-Mount 2-tube receiver comes in two versions: Model A is without relay and Model B is complete with Price Electric Relay, size 1 1/4 x 3 1/2" with less than 3 oz. weight. "A" as wired kit is \$9.95; completed receiver factory wired and tested is \$14.95. Model B with Price relay is \$19.95 in kit form; \$21.95 wired, tested, ready to go.

ESSCO, 88 Walker St., New York City 13.



Famous 1870 Colt .45 caliber 6-shot revolver dubbed the "Peacemaker" by some and the "Equalizer" by others was described in great detail by J. M. Triggs in the April '55 issue of *ATH*. Now comes an assembly set by Revell incorporating fine engraving, checkered ivory grip in plastic-simulated steel and ivory. Valuable addition to any collection.

Revell, Inc., Venice, Cal.



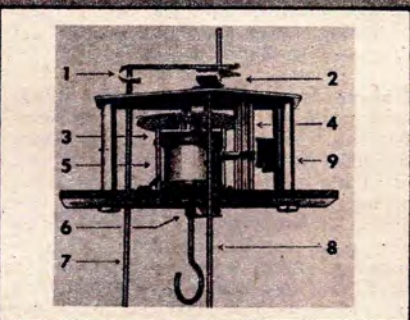
Seven new Chemilol O&R accessories include mounting bolts set in 2" x 4-40 to 1 1/4" x 4-40 sizes with washers at 15¢ per set; battery cord set with instant clip, soldered battery terminals and 30" of plastic-coated stranded copper wire at 50¢; and separately packaged instant clip for 15¢. Special 10¢ washer assortment includes metal and fiber, lock washers.

Chemilol Corp., 9307 E. Northside St., Riverside, Cal.



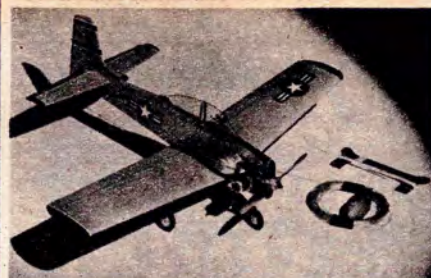
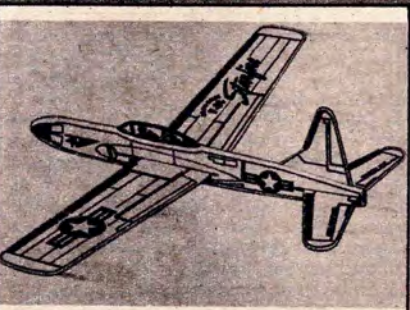
Habcock Super-Compound Escapement offers: 1) rudder linkage and 2) elevator linkage; 3) coaxial magnetic circuit; 4) speed control pinion; 5) mechanism mounted between protecting plates; 6) positionable secondary escapement switch; 7) rudder torque rod; 8) elevator torque rod; 9) rust and corrosion proof parts for long life.

Habcock Radio Reg. Co., 7042 Woodley Ave., Van Nuys, Cal.



Gullow's new **Starfire** glider is a larger (16" wingspan) model capable of some lengthy flights. The concealed nose weight and colored plastic silhouette canopy make it an attractive 25¢ affair for beginners. Balsawood is imprinted in three colors to realistically copy the Lockheed fighter from which it is modeled. Profile body is rounded.

Paul K. Gullow, Inc., Wakefield, Mass.



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(Continued from page 81)

ting for 500 to 650 square inches in the wing. Basic designs are leaning towards undercambered airfoils so that a short take-off run will be possible; the low pitch props of 3" pitch will also be popular. In A/2 the ships we have seen so far are larger. The extra ounce with the more powerful motors available does not seem to make any difference. Tom Henebry's has been in action and performs even better than his last year's record setter.

It has been forecast by those who lift the most, that last year's record will be shattered by almost a half pound or will be close to 40 ounces.

International Interest. There was also talk of holding the West Coast Wakefield, FAI and Nordic semi-finals at Vessels the Sunday prior to the Nats, which certainly sounds like a very practical idea since it would make the Nats and this very important event accessible to all and require only one long trip for most of the guys and would certainly command much more interest. What with the proposed German site for the finals, most guys we know really want to make this trip. This German site brought up a lot of discussion as to how the team would be able to attend, since the cost of financing such a team would be tremendous but—sober minds seemed to think that some promises of some sort must have been made for Carl Wheeley to propose such a thing, notwithstanding the Olympics idea and the funds the continental model builders just don't have.

Industry Items. Speaking of things international, Bill Wisniewski's record topping K&B powered Class II FAI speed job had a total displacement of only .265 cubic inches, according to the Bureau of Standards, which makes one wonder just what he could have turned if that displacement had been the maximum available—and remember this was an experimental handmade model. Rumors have it that this new 29 will soon make its debut. John Brodbeck states that the latest 15's are putting out 1000 to 1500 more rpm.

Lud Kading is coming out with a graphite-impregnated rubber piston in his timers which promises to be self-lubricating. Initial tests indicate that no lubrication at all is necessary.

Airborne Air Car. Air cars are things which seem to defy the laws of aerodynamics. At a recent contest Mark Tackett's Atwood powered job slipped out of his hand and took off across the parking lot. After about 25 to 30 feet of run, it spun around, came out of this spin in a vertical position and proceeded to climb straight up for about 200 to 250 feet before leveling out and then diving in. Just what this proves we don't know, but of all the theories advanced the best one seems to be that centrifugal force of the revolving wheels and body stabilized the car until it was upset in direction by some force, which then allowed ole man gravity to take over; time about 25 seconds, distance 200 yards—but what?

A recent club contest of the AVA-Toros proved that hand-launched gliders and rubber models can still command the attention of the model builders, if they are allowed to. More than 20 newcomers to the sport showed up and put in more than three hours of hectic action. Limited rubber averages of more than 2 1/2 minutes were posted as well as hand-launch times of over 2 minutes. Bob Munson flew a rubber job to the high time. Bob does a very neat job of build-

ing and is a serious modeler, one who devours every tip he can get. Bob Aronson and Everett Beckley, along with Bobbie Ankie, are all glider enthusiasts who already are doing more than 30 seconds on every flight.

Contests. We managed to get a complete list of sanctioned meets from Bob Moncrieff, so don't say you didn't know about them:

In April on the 10th an FAI Team Contest at Santa Barbara, on the 17th another Team Race Contest, on the 24th an Olympic Meet in Chino where FAI Gas, Wakefield and Nordic will all compete against one another. In May, May Day will see the Tucson Annual Meet, and on 8th, Santa Barbara's Omnimeet where everything has an event; on the 15th the first payload meet at San Diego takes place, and on the 22nd the State Championships at Moffat Field with Pop Robbers as C.D.

Plenty of contests—will we see you there?

—DICK EVERETT

SOUTHERN SCENES

Greater S.E. Meet. During the last monthly meeting of the Ga. Congress of Model Plane Clubs, plans were made for this year's Greater Southeastern Model Plane Meet. The tentative dates for the meet are June 16, 17, 18 and 19. (See this column next month for final word on the dates.)

The meet this year is sponsored by the Ga. Congress of Model Plane Clubs in cooperation with the U.S. Navy. The site will be the U. S. Naval Air Station in Atlanta. Bulletins will be sent out very soon to hundreds of flyers throughout the Southeast. A grand array of trophies and awards has been arranged for. This year it is planned to award \$50 and \$25 Savings Bonds along with trophies to first- and second-place winners. Third-place winners will probably receive an engine and trophy.

Since this is a four-day meet, the point was brought up that maybe some flyers might not attend because their jobs wouldn't permit so much time out. It was then suggested and approved that no schedule would be set up with the exception of team race and combat. No schedule, meaning anyone can fly any event or any one flight of any event any time during the four days within the flying hours.

The beginning and ending of flying each day will be strictly enforced. Each person's time for cranking, etc. will also be strictly enforced, even if no one is waiting. This is only to make it fair for each flyer.

All events are planned with the exception of A/2 Speed. Team racing will be strictly AMA with a class for Senior-Open Combined and Junior. Scale event and Navy Carrier event will also be strictly AMA. These two events will be in all age class; Jr., Senior, and Open. A new freshman event will be held for flyers 12 years old and under. They will have three events for this group; hand-launched glider, stunt and speed. All speed models must have a landing gear with .19 engine size being maximum. This event will be flown under Class A rules. A special circle will be set up for the freshman control line events.

We should have a bit more news on the meet in the next issue.

For any information concerning the meet write: Lloyd Wason, Contest Director, Decatur Hobby Shop, Decatur, Ga.

R/C League of N. C. Received news

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from Ralph Corelle, Sec., regarding the Radio Control League of North Carolina.

Ralph sends us a report about radio control activities in the Tarheel Country. This was the second gathering, the first organization meeting having been held in Burlington in November of last year. They are set up to have sessions every two months, not as contests, but as get-togethers. A meet is planned for the Labor Day week end which is to be an invitation gathering with modelers from the Georgia to New York area, on the order of the sessions at Selingsgrove, Pa.

Ralph writes of the last meeting of the Radio Flyers League:

"After a very cold and chilly start, the day's flying went into high gear at about noontime. The site was ideal for flying models and would have been wonderful with a little more pleasant weather.

"A total of 71 active flyers registered on the field, with 53 staying for the supper meeting. This group did not produce all their planes, but around 40 planes were on the field. 27½ mc. was by far the most popular frequency . . . with a waiting line. Planes covered all styles from biplanes to low-wings, all the kit designs and many originals. There were only two models with elevator control; one flew rather sensationally! There were two pulse-proportional control models; one flew repeatedly. Crashes there were, unfortunately, but there were no losses due to fly-aways.

"The supper meeting was called to order by President Emerson Ford; the blessing was asked by Jim Thrift, and the group buckled down to the business of deciding on a name for the organization. The selection was, 'Radio Control League of North Carolina,' and the emblem is a map of North Carolina carrying the club name, superimposed on a pair of crossed flags, one the State flag and the other a Confederate flag—defining us positively as Southerners!

"A door prize drawing was made, and

Emmett Sumner won a Buzzard kit.

"After some discussion, it was decided to hold the next meeting at Winston-Salem on March 6th. It will surely be warmer, but might be more windy! Following a discussion of the Labor Day

Meet, which we want to be a very big time, the business session was adjourned and the session turned over to Jim
(Continued on page 97)

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Hobby Club Emblems



A very active group whose members hold most of the State records, one national, and two more applied for, the Ute Aero Modelers of Salt Lake City are presently engaged in running monthly "Olympics." Meets are a combination of various events such as the Nordic, F.A.I. Gas or Wakefield, with trophies awarded for top duration. Officers: Barney J. Taft, President, Robert Barney, Vice-President, David J. Taft, Secretary-Treasurer. A newspaper, "Salt Flat Sentinel," is published by Hal Yeager. Club is chartered by the Academy of Model Aeronautics.



With a membership of 25, the Yonkers Glow Devils, of Yonkers, N. Y., are active in many phases of model aviation. Principal interest is in free flight, control-line and R/C. Officers are: Earl Symonds, President; John Evans, Vice-President; Jim Belknap, Secretary-Treasurer. Sponsor of the club is Sol Berman who operates the Yonkers Hobbies Shop. Berman also provides group with a meeting place on the premises of his business located at 444 South Broadway, Yonkers. Here the members gather every Thursday night to discuss future plans and activities.



RAMS or Republic Aviation Model Society, Farmingdale, N. Y., consists of employees of the concern building Thunderjet and Thunderstreak jet fighters. Members fly all types of planes from gliders to R/C models. Most unusual part of their activities is giving free demonstrations of model flying at various children's benefits on Long Island by a special team of top flyers. The exhibition consists of stunt, balloon busting and other events. Club meets every Saturday morning at St. Thomas Parish, Farmingdale. Contact man: A. Zanzonico, c/o Recreation Dir., Republic Aviation Corp.

Send your club insignia—with info on your group. ATH will pay \$10 for each emblem and report used here. Type data and send only printed emblems—no sketches.

Air Trails HOBBIES For Young Men

MAY, 1955

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NEW R/C EQUIPMENT at bargain prices. Send stamp addressed envelope for list. William Kremer, P.O. Box 9633, Tulsa 7, Okla.

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HELP WANTED

AVIATION JOBS—Names and addresses of companies to contact. \$1.00. Fitzgerald, Dept. A-15, 815 Countryside Drive, Wheaton, Ill.

PILOTS; A & E mechanics; Aeronautical engineers, draftsmen, designers; Airline flight engineers; navigators; ticket, reservation, cargo agents; stock clerks; teletype operators; meteorologists; radio operators; technicians; electricians; Aircraft factory workers, assemblers, tool designers, machinists. All aviation specialists, trainees. \$2 brings latest reports on world-wide aviation employment opportunities. Aviation Employment Service, Holtsville 5, N. Y.

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AT LAST! A publication devoted to the aircraft homebuilder and enthusiast. Latest news, photos, plans and regulations. Send \$2.25 sample copy. Experimenter, 3801 S. 56th Street, Milwaukee 14, Wis.

BOOKS

MODEL AERONAUTICS YEARBOOKS still available. 1951-52, 1953 and 1958 re-print. \$1.00 each. Model Aeronautic Publications, Box 333, Station D, New York 3, N. Y.

MODEL BUILDER CLUBS

MODEL RAILROADING—National Model Railroad Association, c/o Robert Bast, Box 1138, Canton, Ohio. Include 10c with request for membership details.

CANADIAN AIR-MODELING—Model Aeronautics Association of Canada, 2109 Bleury Street, Montreal, Que. Send 10c for details.

RACE CARS—American Miniature Racing Car Association. For membership information send 10c to Carl Noward, 1384 Berdan Avenue, Toledo 12, Ohio.

MAY, 1955

(Continued from page 95)

Thrill who presented Tom Davis, Pres. of Piedmont Airlines, our speaker for the evening.

"Mr. Davis gave an interesting talk on gliding and soaring. He covered the history of gliding from early days to the present, describing the different types of flying that can be done and some of the fantastic things that have been accomplished in motorless craft, and discussed the difference in technique between powered and motorless flight. He told us of his personal experiences and closed with an invitation for questions. The group's keen interests was evidenced by the many questions he did receive.

"Following Mr. Davis' talk and the discussion, Jim Thrift showed colored slides of the Burlington meet to the crowd who remained.

"The entry of 27 new members brings our roster up to 91!"

Multi-Engine Orangeburg. Larry Bly, of Orangeburg, S.C. sends word of the first meet scheduled for that fair city. Larry says it has always been his hope that Orangeburg would support a contest and finally his dream is coming true.

The Exchange Club of Orangeburg is behind the newly formed model group 100%, and will sponsor their meet this year. The Exchangers have been instrumental in getting two circles paved at the local airport and also the loan of a shack there. The shack, to be used for storing planes and supplies, needs remodeling, and the Exchange group will furnish materials, with modelers doing the work.

Although the club voted to go ahead with the meet this summer, no dates are set. We're hoping it will be sometime in May. Larry will be C.D. for the meet and will send bulletins. Orangeburg is hoping to make this a yearly event. We hope so too.

Among the advanced modelers in Orangeburg there is an all multi-engine Scale Team, with, four boys so far, building multi-engine ships for this summer.

Special Note from R. H. Elliott. From my sickbed I must acknowledge a nice letter from Larry Bly of Orangeburg, S.C. Larry and his wife Barbara have been conspicuous at meets throughout the South during the years I have been interested in model aviation. Every year that we have been at the same meets I have urged them to hold a meet in Orangeburg. Now it is good news to hear that at last Orangeburg will hold a meet and I regret very much that now, of all times, I cannot be there. I am sure that all of you remember Larry and his attractive wife. Both these modelers are good scale builders. I do wish you promoters at Orangeburg have success at your first meet.

I trust that the leaders who plan to attend this meet will introduce themselves to Larry and help him in every way possible.

During my sickness, which has been quite prolonged, my son, Bob has been pinch-hitting for me in writing this column. Please bear with me and send Bob all your news. I would like very much to hear from you boys overseas.

—ROBERT W. ELLIOTT

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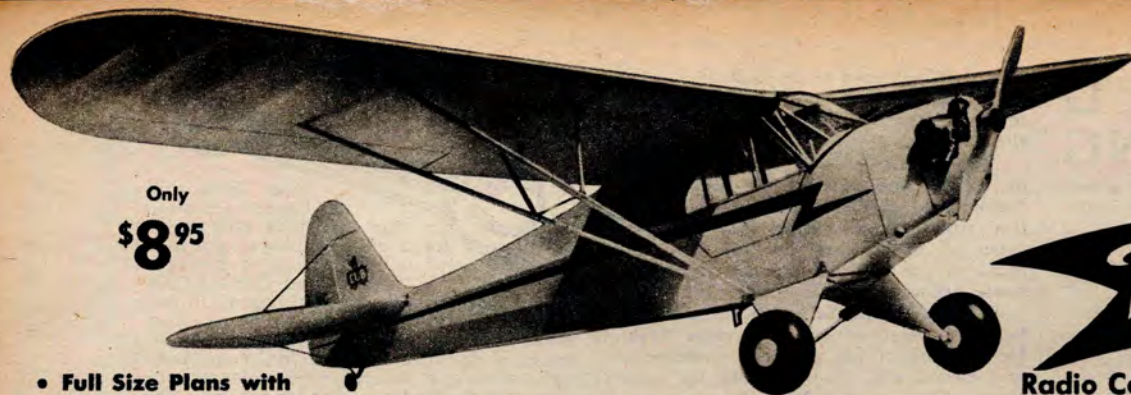
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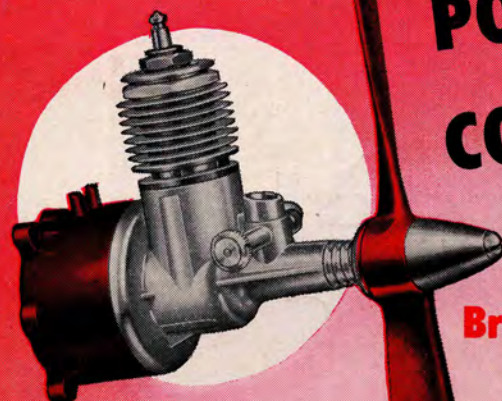
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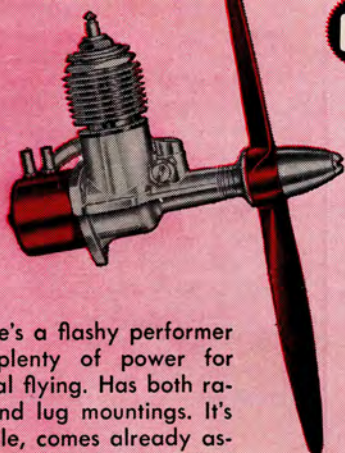
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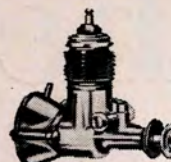
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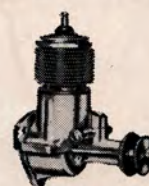
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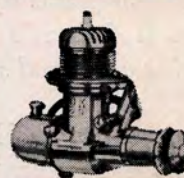
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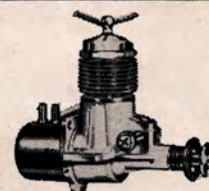
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